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ABSTRACT

The study assessed the use of vouchers for funding manpower training, using the GI bill as a test case. Focus was on vocational training, although on-the-job training (OJT), correspondence, and college training were also examined. The value of training was estimated by the extent to which it leads to increased earnings. Longitudinal earnings histories of veterans who used each type of training were compared to those of a control group of nonusers with similar personal characteristics and initial earning capacity. The gain due to training was estimated as the difference between the earnings of trainees and the earnings of the control group. The study showed that vocational trainees funded by the GI bill increased their earnings by about 10%, about twice as great an increase as had been estimated elsewhere for nonvoucher government programs. The training appeared to be particularly valuable for blacks and for those with relatively little prior education. Analysis of the use of benefits by Vietnam-era veterans showed that blacks participate in training at a higher rate than similar whites.
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VOUCHER FUNDING OF TRAINING:

A STUDY OF THE GI BILL

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U.S. DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
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The GI Bill data used in this study represents only veterans separated from active duty in the Armed Forces after July 1968, and only about two thirds of the veterans in that group are included. The findings of this study cannot be generalized to veterans eligible under the current GI Bill who were separated from the Armed Forces prior to July 1968, or to officers, females, enlisted men who have served for more than 6 years, and enlisted men who were released before completion of their commitment.

The report does not necessarily represent the official opinions or policies of the U.S. Department of Labor or of the cooperating agencies. All views expressed in this report, including judgments about the operations or effectiveness of the GI Bill, and any errors in the analysis or in interpretation of the data are the responsibility of the authors alone.

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CHAPTER 1

INTRODUCTION

The GI Bill educational benefits program is one of the oldest "human resource" programs in the Federal Government. In fiscal year 1976, it paid out about 6 billion dollars to eligible veterans and their dependents.¹ Since the end of World War II it has gone through three phases -- the World War II bill which began in June 1944 and covered veterans who had served between September 1940 and July 1948; the Korean Conflict bill which began August 1952 and covered persons who served on active duty between June 1950 and January 1955; and the current post-Korean bill which began in June 1966 and covers three groups: peacetime post-Korean veterans (who had served on active duty between January 1955 and August 1964), Vietnam era veterans who served on active duty from August 1964 to May 1975, and post-Vietnam era veterans who served on active duty after May 1975.

As of this writing (August 1976) the latest bill was still in force and was applicable to all persons entering the armed services. Thus, except for the three year period

¹The 6 billion dollars expended amounted to more than 50% of federal expenditures on post-secondary education and training in FY 1976. See Special Analyses, Budget of the United States Government, 1977, Office of Management and Budget, Tables I-1, I-2, J-2, and J-3.

following World War II (July 1947-June 1950), active duty service in the military has carried with it the opportunity to obtain post-service education and training benefits.¹

The original GI Bill legislation was not meant to provide an entitlement to all veterans who had served honorably. The veteran had to demonstrate that his education or training plans had been interrupted by the war and, if he qualified, the VA paid his tuition and provided the veteran with a living allowance.

In late 1945 the original 1944 GI Bill was amended to create the type of entitlement program we have under the current GI Bill: eligibility is based simply on the length of active duty and the veteran is given a grant which he allocates between tuition and living costs.²

Although there have been some differences, the programs under all three bills have had three important features in

¹The group that was covered retroactively by the latest bill -- those who served on active duty between Jan. 1955 and August 1964 -- did not expect to have any entitlement while they were on active duty. Also they were on the average older and further along in their civilian career paths during their entitlement period than other veteran groups were.

²While eligibility is determined by length of service, the amount of the monthly payment varies depending on the veteran's number of dependents, whether he is enrolled in institutional training, on-the-job training or correspondence school courses, and whether full-time or part-time training is undertaken.

common -- a substantial monetary entitlement,¹ a long post-service time span during which to exercise their option,² and a wide degree of latitude in choosing forms of training.

Our study of the GI Bill is primarily motivated by an interest in the mechanism by which it delivers its support. Unlike most government training programs which provide support directly to institutions, the GI Bill is a "voucher" system; it provides financial support for training to the trainee, to be used for the type of training the veteran desires - whether it be formal college training, vocational training, enrollment in correspondence courses, or on-the-job training (OJT).

The use of vouchers is often advocated on grounds that the trainee's freedom to choose his course of study ensures that providers will be responsive to the interests of trainees and, at the same time, will seek to be efficient in the provision of services. Opponents of vouchers often object that those with limited prior education, who are most in need of training are also those least able to make wise choices among training types and institutions.

¹The current full time monthly benefit amount for a single veteran with no dependents is \$270 (tax free). This means that a 36 month entitlement amounts to \$9,720 in total potential benefits available.

²Under the World War II and Korean programs, the veteran had to begin using his benefits by four (three in the Korean program) years after separation. Under the current bill the veteran can begin using his benefits at any time within the total eligibility period of ten years.

This study is not an evaluation of the GI Bill, the merits of which should not be judged on the basis of educational outcomes. Many view it as compensation to veterans for disruptions in their lives occasioned by the nation's need for military manpower in a time of danger. Our concern is whether voucher funding, the delivery mechanism used by the GI Bill, can be used by other government agencies that provide training services.

The study addresses two main issues. First, is training financed through a voucher system worthwhile from the trainee's viewpoint? Second, do veterans, particularly those disadvantaged groups who need help the most, take advantage of the opportunities afforded by the GI Bill?

We measure the value of training by how much it increases the earnings of trainees, concentrating most attention on vocational training. The effects of various types of training are estimated by comparing the earnings of trainees to the earnings of similar veterans who did not undertake training. The analysis considers how the personal characteristics of the veterans, including race and prior education, affect earnings. The results of the study suggest that vocational training financed by the GI Bill has been more productive than vocational training provided under more traditional delivery systems and that training is more valuable for blacks than for non-blacks.

Historical patterns of participation are examined to compare current levels of use with experience after World War II and the Korean War. The use of benefits by Vietnam era veterans is then studied in detail. The study shows that when test scores and prior educational attainment are equal,

blacks use training benefits at a higher rate than non-blacks, and they use them for serious studies. Veterans with low levels of prior educational attainment use benefits less often than those with more prior education, but recent trends in participation suggest that this differential is disappearing in more recent cohorts of separatees.

An important side issue is whether standards of quality can be imposed on training institutions when support is provided through a voucher system. Appendix A to this report examines the system of administrative procedures used by the VA to ensure that providers of training are in fact meeting basic quality standards. The review concludes that administrative procedures are such that the offering of low quality training by proprietary schools is not a serious problem and the utility of vouchers is not seriously threatened by the quality problem.

CHAPTER 2

EFFECTS OF GI BILL PARTICIPATION ON EARNINGS

In this chapter we examine the effects of GI Bill participation on earnings. The assessment is particularly important because the potential effectiveness of the GI Bill in raising the earnings of participants is one of the strongest arguments offered for the use of vouchers rather than other delivery systems.

Because most government manpower training programs concentrate on providing classroom type vocational training, this chapter focuses primarily on those GI Bill users participating in this type of training. More limited government resources are devoted to on-the-job training (OJT), and we examine this type of GI Bill training to a lesser extent. We also present some discussion of college education and correspondence courses that are available through the GI Bill but are not typical of other government manpower programs.

Prior to this study, very little reliable evidence existed on the impact of GI Bill participation on earnings. A major part of the research effort was devoted to assembling an adequate data base. We were able to assemble information

on approximately 70,000 GI's who separated in FY 69, about 10 percent of FY 69 separatees. Our information included detailed data on GI Bill use from the Veterans Administration (VA), military service records from the Department of Defense (DOD), and earnings histories from the Social Security Administration (SSA).¹

Although we believe our analysis represents a considerable advance over previous work, we do not consider the findings presented here as definitive. We had only a limited amount of time to carry out our econometric analysis of what turns out to be an extremely difficult problem. Nevertheless, we feel that these results indicate that resources devoted to the GI Bill were, in most cases, highly productive.

VOCATIONAL TRAINING

In order to measure the effect of vocational training on earning capacity, we need estimates of what the vocational trainees would have earned in the absence of training. The most successful method for assessing what earnings would have been is to use the earnings of a group of non-trainees who are statistically matched to trainees on the basis of personal characteristics and earnings during the years immediately preceding the training period.²

¹For a more detailed description of the data, see Appendix B.

²See: Thomas Cooley, et. al., The Impact of Manpower Training on Earnings: An Econometric Analysis, Report prepared for the Office of Program Evaluation, Department of Labor, September 1975. Louis Jacobson, The Use of Longitudinal Data to Assess the Impact of Manpower Training on Earnings, Public Research Institute, Arlington, Virginia, July 1973, PRI 73-2.

This is essentially the approach used here. A major problem not present in other studies is that prior earnings for most GI Bill supported vocational trainees (i.e. those who began training soon after leaving active duty) are dominated by military pay which is quite uniform and does not adequately reflect differences in individual human capital.

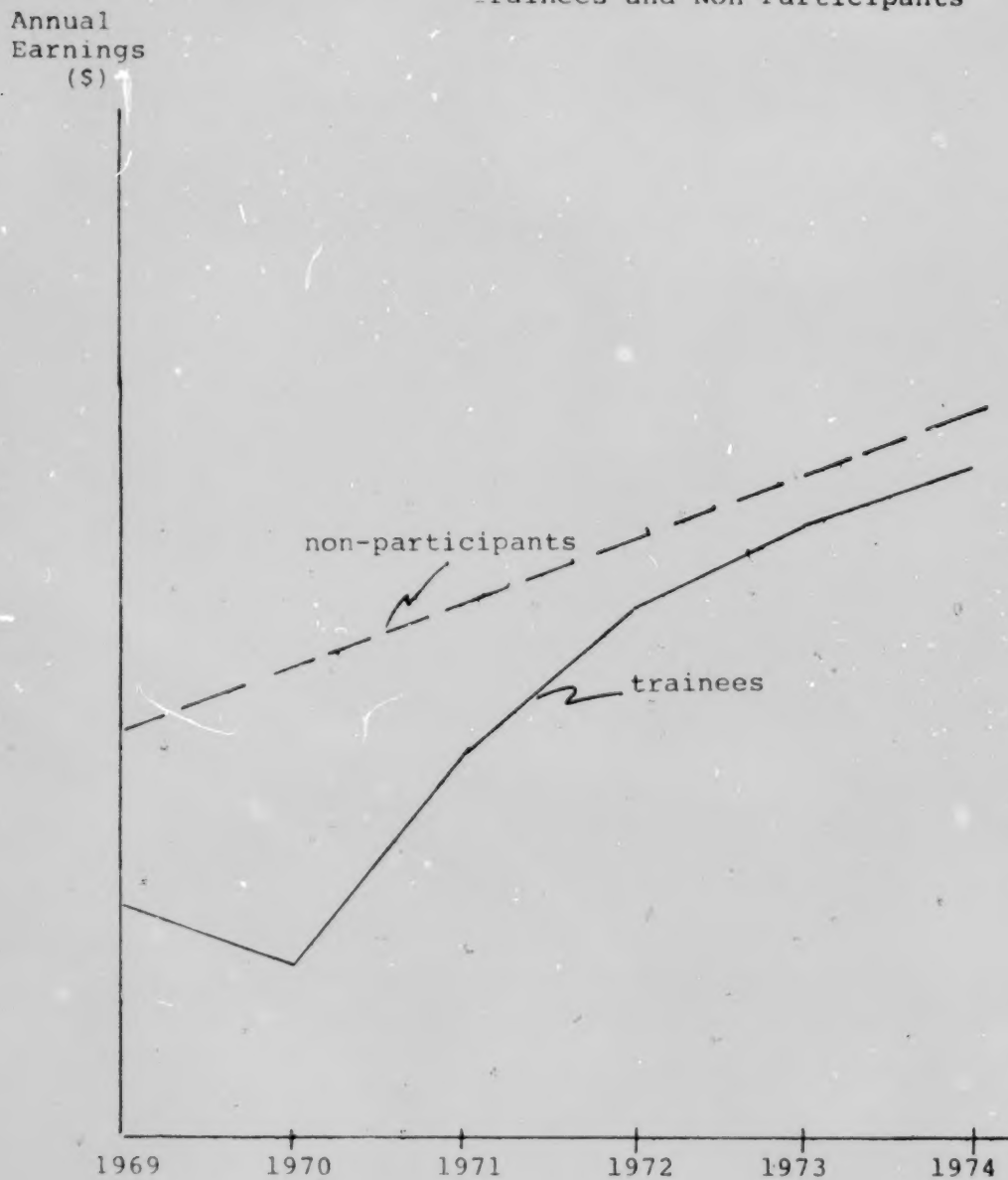
Unless we can find an adequate measure of what these trainees could have earned if they had not entered training, the comparison between non-trainees and trainees is likely to greatly underestimate the impact of training. This would be the case even if differences in personal characteristics are taken into account.

This is due to the high probability of "self-selection bias." Veterans who enter vocational training schools often do so precisely because they are having trouble finding adequate employment.¹ Because they have worse job prospects, they are not like average non-trainees with similar personal characteristics. We would therefore expect the earnings capacity of veterans using the GI Bill for vocational training to be far lower than that of an apparently similar veteran who does not use the GI Bill.

¹The next chapter presents evidence that the unemployment rate has a statistically significant positive effect on participation. This finding also supports the self-selectivity hypothesis.

The hypothetical earnings profiles shown in figure 1 illustrates the type of erroneous conclusion that might be reached if the problem of self selection bias is ignored. The solid line represents the actual earnings of vocational training participants while the dashed line represents the earnings of non-participants matched to the participant based only on personal characteristics. The initial dip in the earnings of trainees is due to the fact that they have withdrawn from the labor force to participate in training. The rapid rise results from increased earnings capacity and employment following re-entry to the labor force after the completion of training. The vertical difference between the two lines in the post-training period represents the impact of training. In this case, the impact of training appears to be a significant earnings reduction. The problem is that the full-time earnings potential of the participants is not properly measured by the upper line, showing the earnings of the non-trainees. Even after controlling for personal characteristics, the non-participants are individuals who had good job opportunities open to them upon leaving service, and their earnings will overstate the mean earnings of all veterans. Only after the upper line is properly adjusted, taking job opportunities into account, can an appropriate comparison be made.

Figure 1: Hypothetical Earnings Growth For
Trainees and Non-Participants



Estimating Earnings of a Comparison Group

In our analysis we are going to focus on vocational trainees who began training soon after separation ("early starters"), went full-time to school and participated on a continuous¹ basis. Although this omits users who trained part-time or attended full-time but on a discontinuous basis, it includes a majority of the vocational users and includes individuals to whom the bulk of the resources were devoted.²

A two step procedure was used to estimate the earnings of an appropriate comparison group for the above group of participants.

The first step is to estimate what early starters would have earned as non-trainees during the time they were in training. We do this by examining the pre-training earnings of vocational trainees who did not enter training until one or more years following separation from the military.

The second step is to estimate what early starters would have earned in the post-training period in the absence of training. We do this by examining earnings, in the post-training period, of those non-participants whose earnings level during the training period matched that estimated for participants

¹We do not have direct information on the continuity of participation. See Appendix B for a detailed discussion.

²This also appears to be the most appropriate group for the purpose of comparison with more traditional manpower programs. For example, under the MDTA program, attendance was mostly full-time and individuals were supposed to attend continuously.

in step one. In addition, we required that the non-participants match the early starting trainees with respect to prior schooling, test score, and other personal characteristics.

Table 1 presents estimates of what early starting vocational trainees would have earned in 1969 and 1970 if they had not been in training during this time. The estimates in the first row are based on the observed earnings of vocational trainees who started training during 1970. The estimates in the second row are based on the 1969 and 1970 earnings of users who did not start training until after January 1, 1971 -- about two years after separation ("late starters"). The numbers in the second row are larger than the actual average earnings of the late starters in those years. They have been adjusted upward to account for the somewhat greater prior schooling, higher test scores, and other differences in personal characteristics between the early and late starting vocational trainees.

TABLE 1
ESTIMATED POTENTIAL EARNINGS OF FULL-TIME
EARLY STARTING VOCATIONAL TRAINEES

	<u>1969</u>	<u>1970</u>
Based on earnings of individuals who started in 1970	\$4,250	(\$5,078)
Based on earnings of individuals starting after 1970	\$4,437	\$5,302

Note that the 1969 earnings of 1970 starters are lower than the 1969 earnings based on those starting after 1971. This is because an individual's decision to enroll in vocational training is affected by his job prospects. We suspect that after controlling for personal characteristics, the earlier an individual entered training, the worse were his job prospects. Thus, the potential earnings of early starters were probably lower than \$4,250 in 1969. Nevertheless, we will use \$4,250 as the potential 1969 earnings of early starters. To estimate the 1970 earnings of early starters, we assume that their earnings would have grown at the same rate between 1969 and 1970 as the earnings of late starters did. Thus our estimated 1970 earnings of early starters are \$5,078 (that is $4,250 \times \frac{5,302}{4,437}$). Note that \$4,250 and \$5,078 are considerably below the average earnings of all non-users during the same years.

To estimate how much vocational trainees would have earned without training in the years after the training interval, we adjusted the average earnings of non-users, in the post-training years, for differences in early earnings and personal characteristics. This was done using coefficients from multiple regression equations fit to data on the individual non-users for each year. Appendix B presents the details of this procedure. We assumed that the earnings of the non-users in 1969 and 1970 were equal to the potential earnings of the users estimated as described above. We also matched users and non-users on all the personal characteristics in our data file.

Column 1 of Table 2 shows the actual average earnings of non-participant users. Column 2 shows the estimated earning profile of the comparison group for early starting full-time vocational trainees. Note that, as expected, the comparison group earnings for full-time users are considerably below the average earnings of all non-users, reflecting the selectivity bias mentioned above.

Average Earning Effects

In order to simplify the exposition, we present the earnings impact for only one group of our early starting, full-time and continuous trainees - individuals starting

TABLE 2

EARNINGS OF COMPARISON GROUP ADJUSTED TO MATCH
INDIVIDUALS WITH IDENTICAL PERSONAL
CHARACTERISTICS, AND ESTIMATED
EARNINGS OF EARLY-STARTING
FULL-TIME PARTICIPANTS

<u>Year</u>	(1) Unadjusted average earnings of all non-users ¹	(2) Comparison group for full-time users
1969	\$5,301	\$4,250
1970	6,511	5,078
1971	7,214	6,024
1972	8,269	7,094
1973	9,433	8,217
1974	9,856	8,576

¹ Non-users are the 34,787 veterans in our file who had not, as of March 1974, used any of their GI Bill entitlement. Only about 70% of the records for this group were usable for this calculation.

before 1970 and terminating in 1971. The results for
this group typify our findings.¹

Figure 2 shows the earning profiles of the full-time comparison group (estimated as described above) and the sub-group of full-time users that started before 1970 and terminated training in 1971. This comparison indicates a positive earnings effect that begins in 1972, the first full year in the labor force after training ends, and continues through 1974. It is about 10% in each year as shown in Table 3. The pattern is similar (although with not quite as large an effect) for full-time participants who started before 1970 and terminated in other years, and for participants who started in 1970 and terminated in 1972. One group of full-timers -- those that started during 1970 and terminated in 1971 -- depart from the pattern in figure 2. Their profile shows no indication that it will rise above that of the comparison group.

For full-time participants who started after Jan 1, 1971 (our "late starters"), we made no estimates because the followup period was too short. In addition, the severe downturn in the economy that started in some sectors during 1972-73 and became pervasive and accelerated during 1973-74 may make the impact of training appear lower for this

¹ See Appendix D.

Annual
Earnings

Figure 2: Earnings Profiles of Vocational Trainees
Who Started Training Before 1970
and Ended in 1971

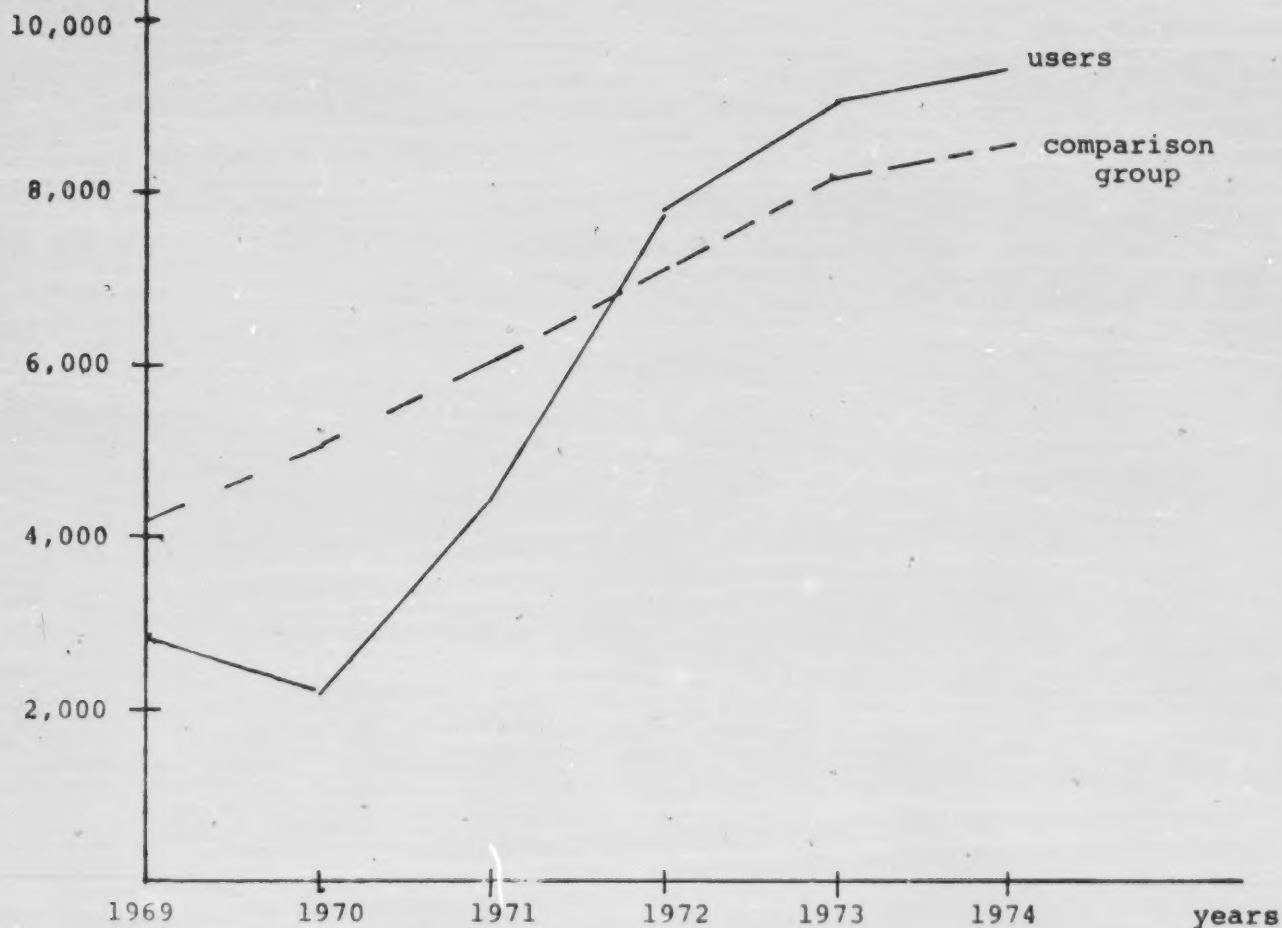


TABLE 3

EARNINGS OF VOCATIONAL TRAINEES AND A
COMPARISON GROUP REFLECTING WHAT
TRAINEES WOULD HAVE EARNED IN
THE ABSENCE OF TRAINING

		Earnings of:		Difference in Earnings	
		Vocational Trainees	Comparison Group	(Trainees minus Comparison Group)	
				(Dollars)	(percent)
Training Period	1969	2847	4250	- 1403	- 33.01
	1970	2245	5078	- 2833	- 55.8
	1971	4492	6024	- 1542	- 25.6
Post Training Period	1972	7817	7094	723	10.2
	1973	9098	8217	881	10.7
	1974	9438	8576	862	10.1

NOTE: The vocational trainees selected in this particular comparison started before 1970 and ended in 1971, but the results typify the overall findings. There are 126 veterans in this group.

period than it will be in the long run. This may be the reason that the percentage gain in the earnings of full-time users remained about the same during the years after training. Human capital theory suggests that the gain might, in the absence of a general economic downturn, have widened during the years after formal training ended.

This same cyclical factor may be partially responsible for the somewhat less encouraging performance of the full-time participants who started in 1970 and ended in 1971.

It is important to note that the 10% annual average increase in earnings resulting from GI Bill supported vocational training appears greater than estimates of the impact of MDTA training on earnings - usually about 5%.¹ We have not gathered all the necessary cost data to make a complete and detailed cost/benefit comparison between the two programs. However, what evidence there is² suggests that the cost of classroom vocational training is less under the GI Bill than it was under the MDTA program. Since forgone earnings are probably about the same, the benefit to cost ratio is greater for the GI Bill.

¹See Jacobson, and Cooley et. al., op. cit.

²Wellford W. Wilms, Public and Proprietary Vocational Training: A Study of Effectiveness (Center for Research and Development in Higher Education, University of California at Berkeley, 1974).

This finding, however, must be regarded as tentative. Several sources of bias, which we have not fully explored could modify this conclusion.

For example, our finding of a 10% earnings increase holds only for full-time and continuous participants. Neither full-time, nor discontinuous and part-time users show gains of this magnitude. In fact, they show only small gains or no change. An important issue is what would happen if part-time or discontinuous use was prohibited as it essentially is in traditional government training programs. If these users choose to take no vocational training, our results would not be affected. If, on the other hand, they were to enter full-time programs, we expect they would probably not do as well as those who originally choose full-time participation. Thus the overall earnings increase would be reduced.¹ It is appropriate to reiterate that most GI vocational trainees are full-time and continuous and comparatively little resources (maybe only 25%) are directed to the "other" group. Thus, the impact on the benefit cost ratio is not likely to be very large.

¹There is some evidence in our data that indicates that the part-time vocational users would not participate at all if full-time participation was made mandatory. Detailed cross-tabulations of earnings profiles show that after controlling for personal characteristics, part-time users tend to have higher earnings than full-time users before training. This suggests that part-time participants already have relatively good jobs and that they would therefore opt not to participate full-time.

In addition, there is a subtle source of bias in a comparison between the vocational training part of the GI Bill and the MDTA that makes the GI Bill appear less productive than it is. It is at least possible that those veterans who would do the best in vocational training choose college or another form of training instead, reducing the net returns to vocational training. Since these alternatives would be precluded in a more traditional program, the non-voucher system may be absorbing a far larger share of these "better" individuals. This has the effect of raising the average productivity of MDTA type training but reduces the overall benefits to the participant population.

THE EFFECT OF ON-THE-JOB TRAINING ON EARNINGS

In this section we examine the effect on earnings of participation in OJT programs by GI Bill users. Under the GI Bill, employers receive no formal payment from either the veteran or the VA for any costs they incur in providing on-the-job training. Benefits are expected to enable the veteran to offer his services during the training period at a lower wage cost to the employer, and indirectly "pay" him for the time of experienced workers who provide the training.¹

¹ Actually one of the provisions of the GI Bill regulations is that a firm must pay starting job trainees at least 50% of the wage he will receive at the end of the training period. This would tend to hamper somewhat the program's potential for creating OJT slots.

If labor markets operated perfectly, we would expect the initial earnings of OJT users to be below initial earnings levels in alternative jobs. If earnings are above what the trainee could earn elsewhere, even during the early period when the job training is taking place, it implies that the labor market is not functioning well.

As in the case of vocational training, the key comparison we wish to make is between the actual earnings of participants and what they would have earned in the absence of training. The methodology used was similar to that described above for obtaining an earnings profile for comparison with on-the-job trainees. The resulting comparison is illustrated in figure 3 and table 4. In this case, the dashed line representing the earnings of the comparison group is everywhere below the solid line representing the earnings of OJT users. There is no doubt that OJT users are better off than they otherwise would be; their earnings are higher and growing more rapidly, and they are also receiving GI Bill benefits.¹ It appears, however, that at least for some OJT users the increased earnings arise, not only from the increase in human capital acquired during training but also from having gained access to a particularly lucrative job.

¹The veteran in OJT receives only a fraction of the benefit that he would receive if enrolled in formal institutional training.

Figure 3: Earnings Profiles of OJT Users Who Started OJT Before 1970 and Ended in 1972

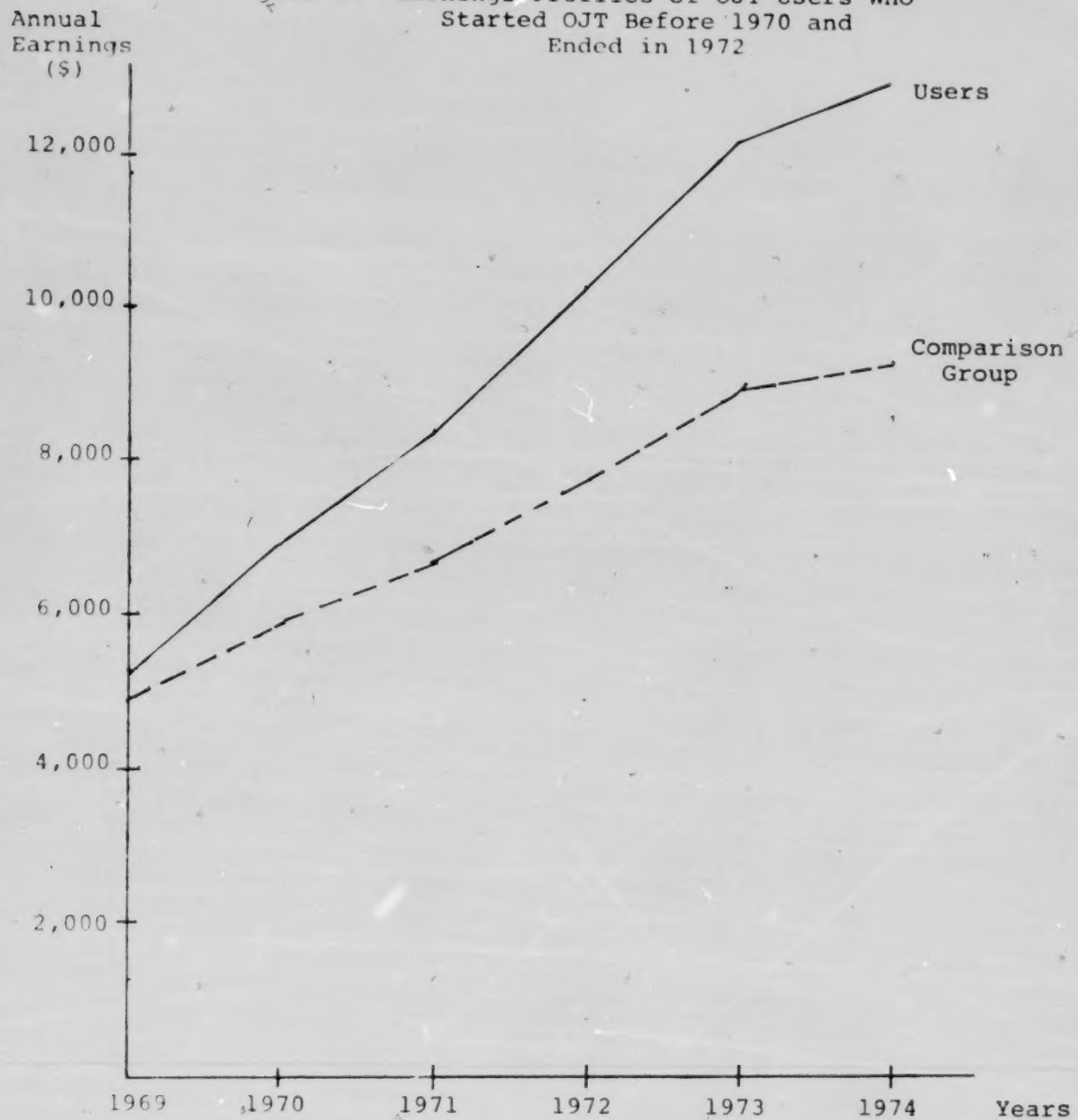


TABLE 4

EARNINGS OF A SELECTED GROUP¹ OF OJT
USERS AND A COMPARISON GROUP²

<u>Year</u>	<u>Comparison Group</u>	<u>OJT Users</u>
1969	\$4,894	\$5,271
1970	5,853	6,984
1971	6,678	8,385
1972	7,747	10,282
1973	8,900	12,198
1974	9,289	12,987

¹This group began training before 1970, terminated training in 1972, and participated continuously for at least 19 months. Sample size = 421.

²Estimated with the same procedure used for obtaining the vocational training comparison group. See Appendix D for the tabulations of the earnings profiles of late starting OJT users used in the estimation.

The strongest evidence for this conclusion is that earnings appear higher than in alternative jobs as soon as training begins. Because no earnings are forgone during training and training is generally free of direct costs to the participant, any veteran fortunate enough to be offered such a position would probably accept. This would be true regardless of whether or not the veteran receives benefits, suggesting that, in many cases, the OJT subsidy probably does not induce more training or improve the earnings of veterans over what they would be in the absence of the program. Only if the existence of the subsidy induces the creation of more OJT positions for veterans, or induces employers to give more of the available slots to veterans, would GI's as a group receive more training. Because the GI bill subsidy is paid directly to the participant rather than the firm, it is not obvious that more positions will be opened to veterans. This contrasts to more conventional OJT programs where a subsidy is paid to firms who hire particular individuals and pay them the usual wage. Such a subsidy reduces the cost to the firm of providing training and could foster an increase in slots or the favoring of government sponsored trainees.

The contrast with vocational training is of great importance and should be made explicit. In the case of

vocational training, the subsidy only partly offsets the very substantial direct tuition cost and loss of earnings. Because, in the absence of the GI Bill, many veterans would not have the financial resources to withdraw from the labor force and pay the other costs of training, they would not undertake training even if training was very effective in raising subsequent earnings. Financial impediments to participation in many OJT opportunities are not evident.

The fact that individuals apparently are being paid more than the minimum necessary to attract them to the OJT position contradicts the standard model of a competitive labor market. It is likely that a market imperfection has limited the wage level offered to trainees and/or the number of slots available. It is possible that a high proportion of OJT positions are in highly unionized industries where entry is restricted. We were able to obtain some additional evidence supporting this hypothesis. Our data permitted us to divide all OJT users into two groups - apprenticeship program participants and others. Although this does not correspond exactly to a union/non-union breakdown, most of the positions involving unions will be identified as apprenticeship slots, while most of the "other OJT" positions will be more informal OJT situations, typically in small non-unionized firms.

Multivariate analysis of the differences in earnings between these two groups revealed that otherwise similar individuals earned 10% more solely as a result of being in an apprenticeship program.

Partitioning of the sample by year of entrance and exit from training showed that in every case the earnings of apprentices were above the comparison earnings even in the year of entrance.¹ There were a few cases, however, where the earnings of "Other OJT" users did not rise above those of the comparison group until after the end of training. The solid line in figure 4 illustrates the earnings profiles for two of these groups and the dashed line is the profile for the comparison group.² Although these groups comprise only about one quarter of all "other" trainees, it is likely that in these cases GI Bill subsidies have induced training and increased the earning potential of a substantial number of veterans.

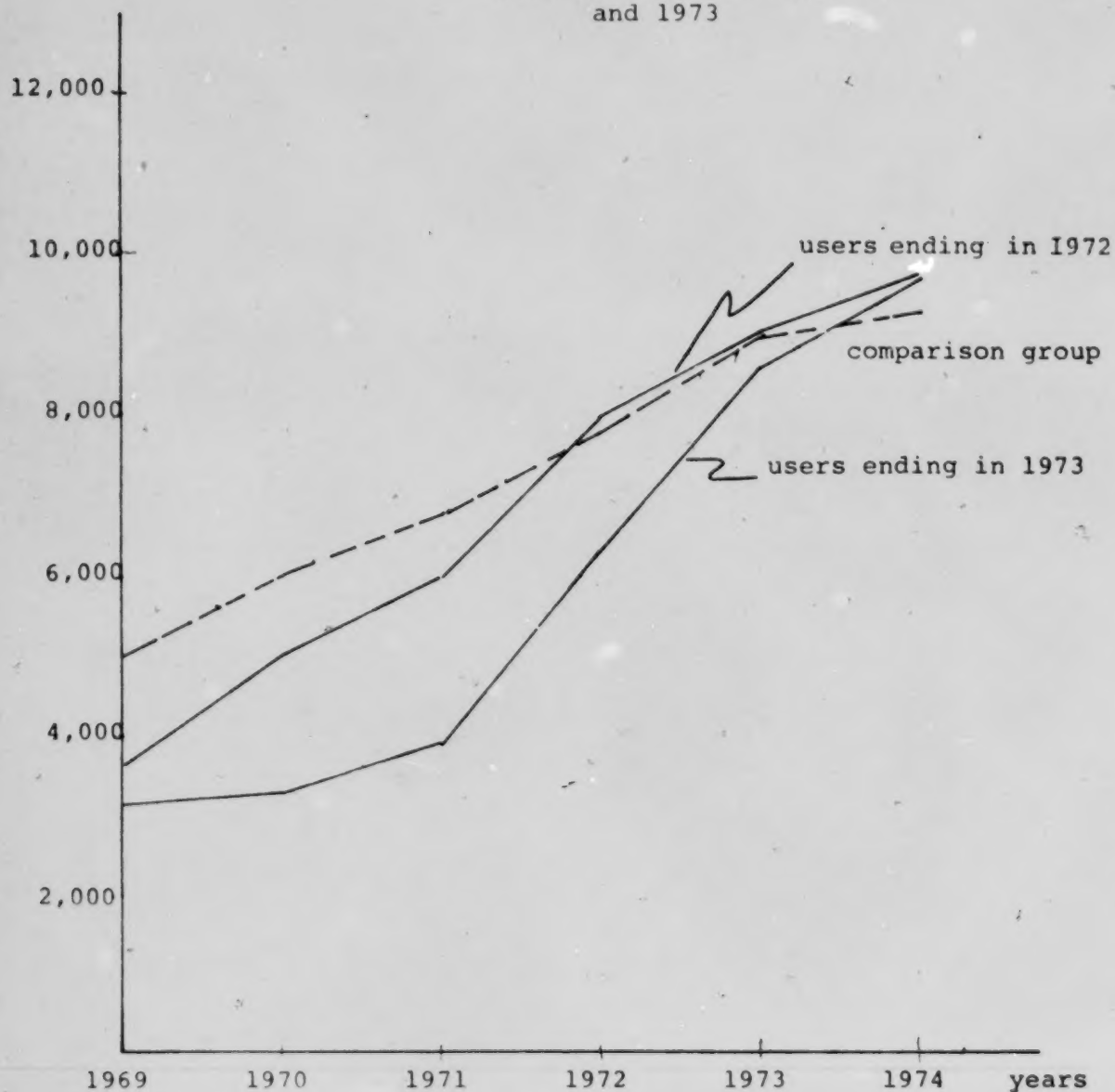
The result is particularly important because the GI Bill system encourages the use of the subsidy for work in smaller firms compared to the non-voucher systems.³ Although

¹See Appendix D.

² The "other OJT" users began training before 1970 and terminated in either 1972 or 1973. The comparison group was derived using the same methodology we used for our vocational training comparisons. The earnings of late starting OJT users in 1969 and 1970 were taken as estimates of what early starting "other OJT" users could have earned if they had not entered OJT.

³In 1975 the percentage of all private sector OJT slots that were in one slot firms ranged from a low of 18-21% in Illinois and Ohio to a high of 42-44% in California and Massachusetts.

Figure 4: Earnings Profiles of "Other OJT" User
Groups Who Started OJT Before
1970 and Ended in 1972
and 1973



the firms typically receive the payment in non-voucher systems, the stringent and expensive reporting requirements effectively make this program profitable only for larger units where many trainees are needed.

In summary, our evidence with respect to the GI Bill as a prototype voucher system for manpower training suggests that allowing the voucher to be used for OJT will not in itself play a particularly important role in permanently increasing the earnings of individuals. The method of distributing the benefit does, however, permit firms in sectors where wage and employment decisions are competitively determined to participate. To the extent that funds are channelled to these positions, the subsidy is probably effective in increasing training and raising earnings.

CORRESPONDENCE COURSES

The GI Bill does not support correspondence training in the same way it supports either institutional training or OJT. Benefits are limited to the amount of tuition paid for the course. Naturally, correspondence training does not require that the trainee withdraw from the labor force while in training, and thus, the cost includes no forgone earnings, only forgone leisure.

A comparison of the average earnings of correspondence users and non-participants is shown in figure 5 and table 5. Users and non-users have essentially the same personal characteristics and appear to face roughly the same job opportunities. As is evident, the earnings profile of correspondence users is remarkably similar to that of non-participants.

There is no evidence that training has affected earnings or that it has involved a cost to the participant. Since this program primarily requires only the giving up of leisure time, knowledge of what courses are available, and how to apply, we expect that veterans will participate regardless of the effect on earnings. The major determinant of their participation is whether they get more enjoyment from the learning process than from the alternative uses of their time. Unlike the case of OJT where earnings increase but slots are hard to find, there is no shortage of correspondence courses.

Our findings may somewhat underestimate the impact of this program. Our tabulation counts as users only those individuals whose last use of benefits was to finance a correspondence course as a low cost source of information, and later elect to either terminate their training before

Figure 5: Earnings Profiles of Correspondence
Users Who Started Correspondence
Training Before 1972

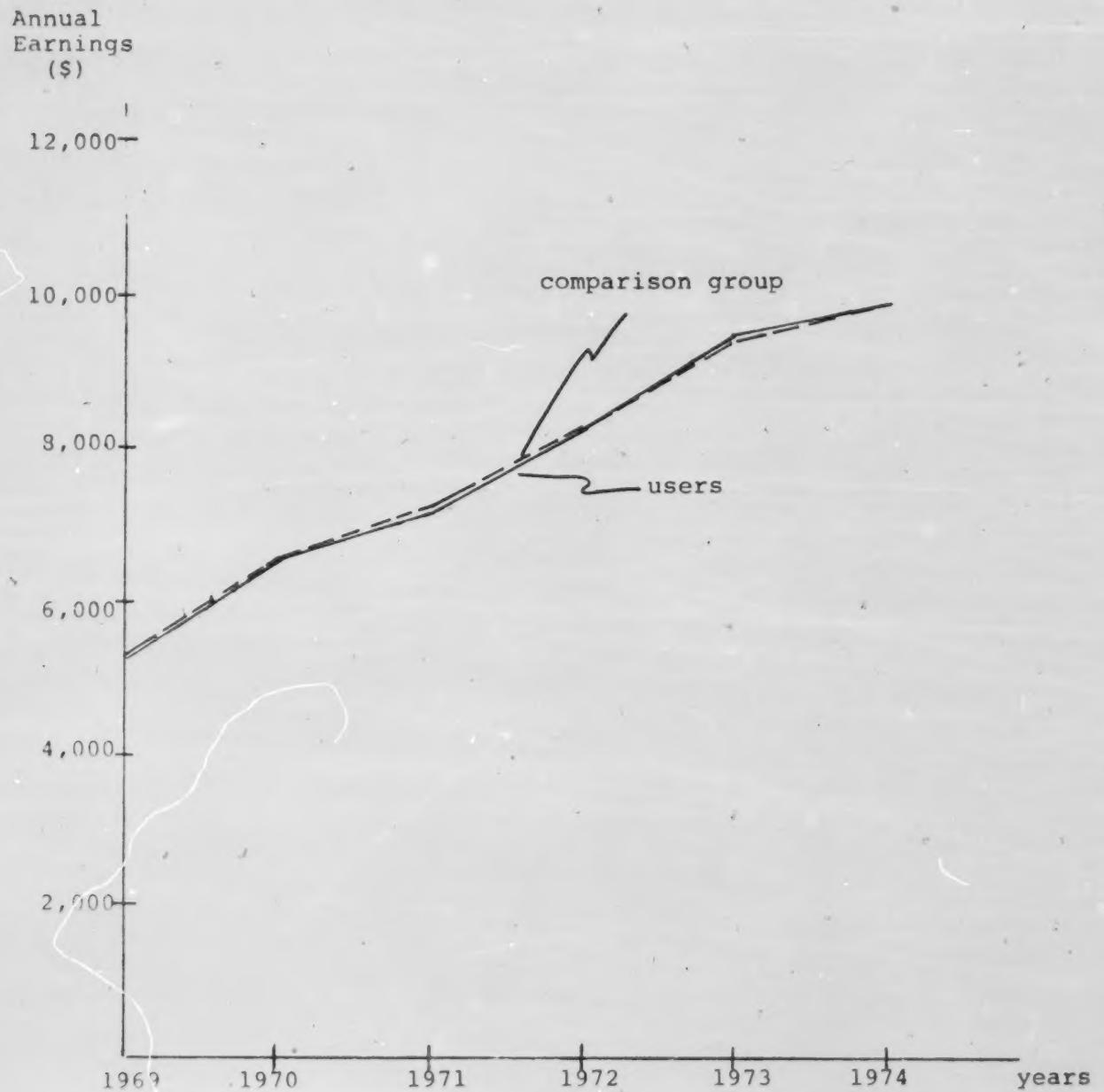


TABLE 5

EARNINGS OF ALL NON-USERS AND OF A
SUB-GROUP OF CORRESPONDENCE USERS¹

<u>Year</u>	<u>Non-Users</u>	<u>Correspondence Users</u>
1969	\$5,305	\$5,283
1970	6,531	6,511
1971	7,231	7,133
1972	8,293	8,243
1973	9,450	9,473
1974	9,878	9,844

¹This group contains 413 veterans who began training anytime before Dec. 1971 and ended during 1971. The average amount spent per course was equal to 4.9 months of entitlement, or about \$875 in terms of benefit levels in 1971.

wasting resources on a high cost, high risk program or choose to participate in a more formal program, knowing that the chances for success are high. Since relatively few veterans record correspondence courses as their last use of GI Bill training, and since a relatively small amount of resources go to this use per capita, it may be that the value of the information gained is well worth the cost. In addition, recent changes in the GI Bill require participants to pay at least 10% of the direct costs. Thus, we are likely to see a greater return in the future.¹

COLLEGE EDUCATION

We could not analyze the effect of college training by GI Bill users as thoroughly as we analyzed the other groups because we did not have a great enough post-training period in which to observe earnings gains. The time spent in direct training is longer as is the period following graduation over which increased education has a strong impact on the rate of increase in earnings. This is because college education is highly complementary with other forms of education, such as management training programs.

¹It is also important to note here that in the follow-up studies done by the VA, correspondence course users who complete the course show a modest earnings advantage over those who did not complete their course. (See Completion Rates for Education and Training Under the Vietnam Era GI Bill, op. cit., Table 3, p.17). Our findings suggest that this differential (about 5%) is probably due, not to the course completion, but rather to the same factors that underly the completion differential itself--more industriousness and a greater span of interest--which would produce an earnings differential even in the absence of the courses.

As shown in figure 6 and table 6, a simple comparison between non-participants and college users indicates that the earnings of college users is increasing at a much higher rate than the earnings of non-participants in 1974, the last year for which we have data. This differential exists despite the fact that 1973-74 was a period of high unemployment in which recent school leavers who lack the protection offered by high seniority might be hurt more severely than others.

Evaluation of the full effect of college education must be deferred until additional years of earnings data become available. Nevertheless, the initial findings are very suggestive that the GI Bill payments are being used productively. The earnings curve for college users in figure 6 indicates that participants are investing significant resources in terms of forgone earnings. The curve is also similar to that observed for college students in general. The best evidence is that the return to college education is in the neighborhood of 10%. Although we cannot yet say categorically this will be the return for the veteran group without further evidence, it appears this is a reasonable estimate, given what we know now.

Figure 6: Earnings Profile of College Users Who Started College Training Before 1970 and Ended in 1971

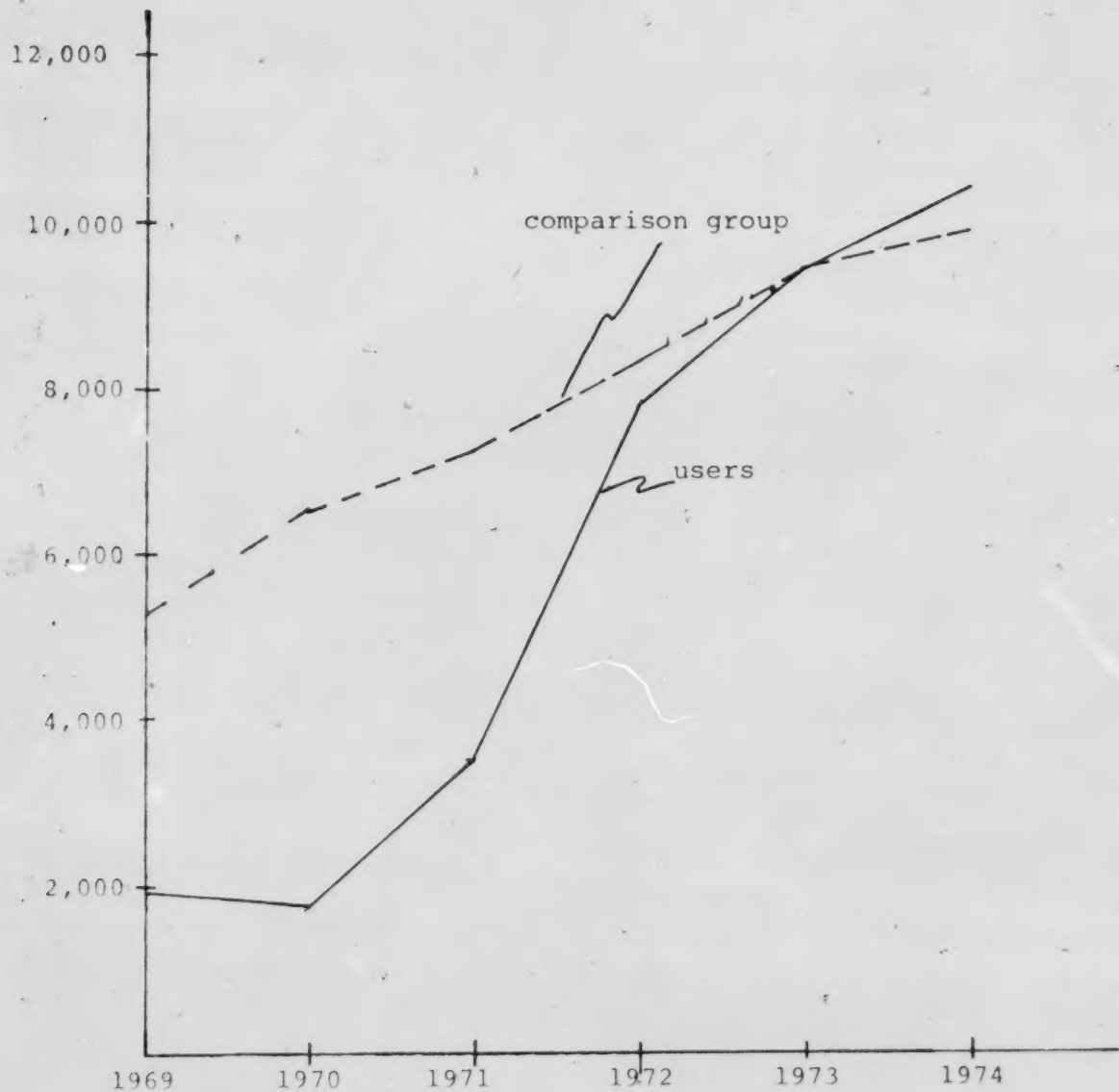


TABLE 6

EARNINGS OF ALL NON-USERS AND OF A
GROUP¹ OF COLLEGE USERS

<u>Year</u>	<u>Non-Users</u>	<u>College Users</u>
1969	\$5,305	\$1,972
1970	6,531	1,781
1971	7,231	3,553
1972	8,293	7,831
1973	9,450	9,483
1974	9,878	10,418

¹Group that began before 1970 terminated in 1971,
and obtained more than 19 months of education.
There are 354 veterans in this group.

THE EFFECT OF TRAINING ON INDIVIDUALS WITH DIFFERENT PERSONAL CHARACTERISTICS

Up to this point we have focused on the existence and magnitude of earnings effects for all participants in different types of training programs. We will now consider how these effects vary for users with different personal characteristics.

Once again our analysis focuses primarily on vocational training with somewhat less complete treatment of OJT. We have omitted college and correspondence users from further analysis because, as already stated, any firm conclusion about the overall effect of college training would be premature, given available data, and in the case of correspondence course, no earnings effect is evident.

The principal question is whether the GI Bill is as effective in aiding those individuals likely to be targets of public policy, such as minority participants and those with less formal schooling, as it is in aiding veterans as a whole. To determine whether training is as productive for the disadvantaged as it is for those who start with a higher endowment of skills and education, it is not enough simply to measure how much earnings increase. The question is one of relative gains; do the disadvantaged gain as much, or more, or less than others as a result of training?

We made such a comparison using multiple regression analysis to measure the impact of specific characteristics such as race and education on earnings, both before and after training. To measure how these characteristics related to earnings after completion of vocational training, we fit multiple regression equation to the post-training earnings of early starting vocational trainees. These equations included variables to control both for personal characteristics of the trainees and for characteristics of their training experience.

Because early starters began training shortly after separation from the service, we could not ascertain directly how their personal characteristics related to earnings prior to training. Instead, we first estimated how the personal characteristics of late starters affected their pre-training earnings. We then assumed that the effect of these characteristics on early starters' earnings in the absence of training would have been about the same as that measured for late starters. This is the same assumption we made in predicting what the earning level of early starters would be in the absence of training.

The results with respect to racial difference were striking. Prior to training, the earnings of blacks were in the neighborhood of 15% lower than the earnings of similar non-blacks. After training, there was no significant racial earnings differential.

Clearly blacks gained much more from training than similar non-blacks. This may be because training provides critical job skills, or because training institutions also serve as placement and career counseling centers,¹ or because training serves a screening process, that helps to identify able and willing workers, or all three of the above. Whatever the explanation, the finding itself provides positive evidence that a voucher type system can be relied on to help blacks participate in the labor market on an equal footing with other segments of society.

Our results for other personal characteristics of vocational trainees also tended to support the hypothesis that target groups do better than average. For instance, training reduces the percentage difference between groups with less than a high school education and those with more education.

Analysis of the effects of on-the-job training, with respect to race and prior education, gave results similar to those derived for vocational training.

¹Studies of the job finding and career counseling process always show that blacks are more dependent on the various formal sources of information--e.g. public employment service. Technical institutes may be an efficient source of this information and thus be relatively more productive for blacks.

CHAPTER 3

PARTICIPATION: PATTERNS, TRENDS, AND DETERMINANTS

The preceding chapters have shown that much of the training under the GI Bill leads to increased earnings for trainees. Vocational training supported by the GI Bill appears to be more productive than was the more traditional institutional training under the MDTA program. On-the-job training under the GI Bill and MDTA have similar effects on earnings, but those earning effects appear to be related more to gaining entry into selected occupations than to the training itself. Correspondence courses apparently have no noticeable effect on earnings, and college training, which other studies have shown to be productive, was examined only cursorily here because of limitations in the data.

The detailed analysis shows that training is particularly valuable for traditionally disadvantaged groups - blacks and others with low levels of prior educational attainment. This is important because a major concern about use of vouchers for delivery of educational benefits is whether disadvantaged groups who can be expected to gain the most from education are able to make effective use of the vouchers. Three issues about the use of vouchers are important:

- o Do the disadvantaged use the vouchers at all?
- o Do they use them productively?
- o Do variations in benefit levels affect participation?

This chapter briefly reviews the use of GI Bill educational benefits since World War II, and examines in detail how the participation of Vietnam era veterans is related to prior educational attainment, racial background, achievement test scores, and a number of other demographic, economic, and program variables.¹

HISTORICAL PATTERNS IN THE USE OF BENEFITS

The proportion of eligible veterans using their educational benefits has varied among the three different entitlements represented by the three GI Bills. As shown on the

¹The data in this chapter on participation rate trends and differentials (except those presented in table 2) relate to a specific sub-group of Vietnam era veterans -- enlisted men who separated from active duty, had completed one term, and also had a reserve obligation. The major groups omitted are: female veterans, officers, retirees, those who separated after more than 6 years of service, and those who received medical or unsuitability discharges. It does include individuals who separated before completing their tour of duty but who the military considered as having satisfactorily completed their obligation (so called "early outs"). The most serious omission would appear to be the group who receive medical or unsuitability discharges. Many of these individuals are eligible for GI Bill benefits. And since this group may contain disproportionately more minority individuals and individuals with low AFQT and educational attainment, some of our findings with regard to differential participation behavior may not reflect the total universe of eligibles. However, our group is by far the largest one so that it is unlikely that inclusion of the unsuitable discharge group would significantly change our findings with regard to overall differentials in participation by color and/or prior schooling.

TABLE 7

COMPARISON OF CUMULATIVE PARTICIPATION
RATES AND OF TYPES OF TRAINING
SELECTED UNDER THREE GI BILLS

Participation and type of training	(1) World War II	(2) Korean conflict	(3) Post- Korean	(4) Vietnam era	(5) Post- Korean conflict (total) ^a
Total veteran population	15,440,000	5,509,000	3,092,000	7,597,000	10,689,000
Percent ever in training	50.5%	43.4%	41.5%	59.3%	54.1%
Total ever in training	7,800,000	2,391,000	1,281,715	4,503,933	5,785,648 ^c
Percent dist. by type ^b	100.0%	100.0%	100.0%	100.0%	100.0%
College	28.6	50.7	51.0	54.2	53.5
Other schools	44.6	36.0	43.1	36.4	37.9
On-the-job trainees	17.9	9.3	4.7	8.9	8.0
Farm trainees	8.8	4.0	1.1	.4	.6

Source: Information Bulletin, Department of Veterans Benefits,
Veterans Administration, DVB IB 20-75-9, June 1975;
Appendix B, table 11, p. 49.

^aIncludes both Vietnam era veterans and the peacetime post-Korean veterans who became eligible retroactively with the passage of the Vietnam era program.

^bThe categories used are very aggregative. Under the present program "College" includes two-year non-degree granting schools and correspondence schools which have VA approval and that offer college level courses. However, the bulk are undergraduate degree-granting schools with the veteran in either part-time or full-time attendance. "Other schools" are primarily vocational/technical schools with about half of these veterans enrolled in correspondence courses and the other half attending institutions. The category also includes flight training, and veterans who are using (or had used) the GI Bill to obtain high school courses. "On-the-job trainees" are about evenly divided between formal apprenticeship situations and less formal on-the-job training arrangements. The "mix" within these broad type categories may have shifted significantly from one bill to the next and this must be kept in mind in making inter-bill comparisons. Indeed, it is highly likely that the recent growth in two-year community colleges plays a role in accounting for some of the inter-bill trends toward relatively more college attendance.

^cIncludes 610,212 personnel still in service.

second line in table 7, about 50% of eligible World War II veterans used their benefits, compared to 43% of Korean War veterans, 41% of the "peacetime" post-Korean war veterans who served in the military some time between January 1955 and August 1964 and 59% of Vietnam era veterans.

The low utilization of benefits by the peacetime post-Korean group relative to the World War II and Korean groups reflects the fact that this group did not know they were going to be eligible for benefits until after most of them had been separated from active duty for at least 6 years. By this time many of the veterans had completed post-secondary education and training, financing it themselves, while many others were so far along in their civilian career paths as to make the opportunity cost of attending schools very large.¹

The comparison shown in table 7 is misleading, however, because it does not control for the amount of time that eligible

¹ It would be interesting to compare the overall level of education and training attained by peacetime post-Korean veterans with that attained by Vietnam era veterans. Since we know that the peacetime group financed less of their post-secondary education and training through the GI Bill, the comparison would shed some light on the broad question of whether the GI Bill subsidy increases investment in education and training or replaces investments that would have taken place anyway.

veterans have left in which to exercise their entitlement.¹ For World War II veterans, the data show their "terminal" or ultimate participation rates after all of them had passed through their entire eight year eligibility period. Many of the 7.6 million Vietnam era veterans who had entered eligible status as of June 1975 and have not yet used their benefits may still choose to do so, however.

In any eligible cohort of veterans, the proportion that has ever used benefits typically increases with time out of service. Figure 7 illustrates how participation has increased over time for a cohort of enlisted reservists who were released between July and December 1968. Analysis of participation rates among different cohorts of veterans released from service in succeeding 6 month periods shows that a larger proportion of those released more recently have used benefits in the first year. Also, there are indications that terminal participation rates among the more recently released groups will be higher. Thus, by the time eligibility has run out for the whole group of veterans now included in the table, participation will be significantly higher than 59%.

¹ It also does not take into account possible changes in the amount of benefits used per participant between the two bills. The increase in the fraction going for formal degrees surely worked to increase benefits per participant. However, there appears to have been a slight decline in the percent collecting full-time benefits, and this works to decrease the benefit amount per participant.

Percent ever
participated

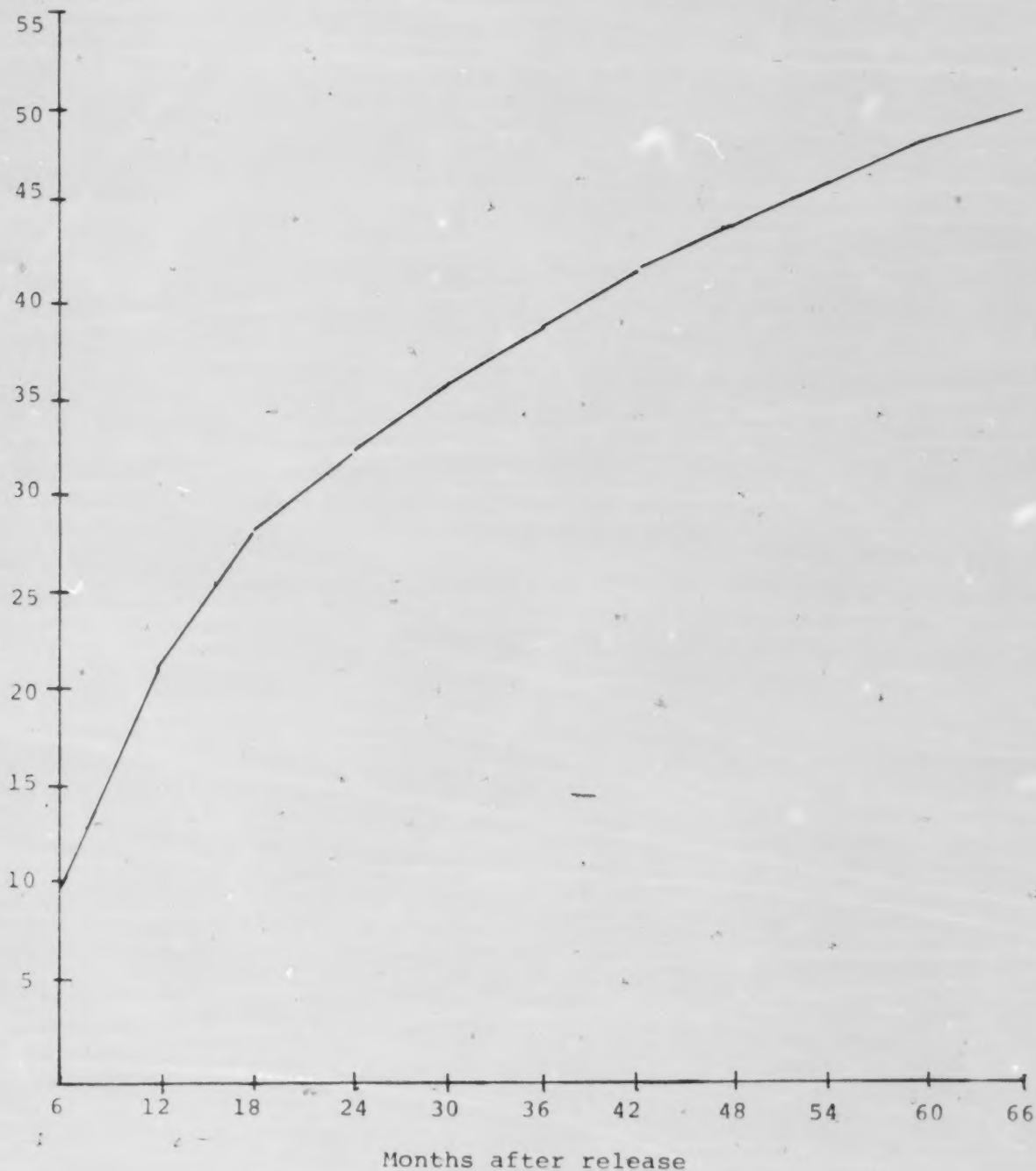


Figure 7: Cumulative Participation in GI Bill Training by
a Cohort of Enlisted Reservists from Service
During July-December 1968

TRENDS IN PARTICIPATION

Table 8 shows in more detail how participation by Vietnam era veterans has been changing. The data cover the period July 1968 to December 1973. Each row of the table refers to one separatee cohort - a group of enlisted veterans with reserve obligations who separated from active duty during a given six month period. The number in parenthesis at the beginning of each row shows the percent of each cohort that had begun GI Bill training while still on active duty. The columns represent successive six month intervals and the entries in the table show the cumulative percent of the cohort who had ever used benefits by the end of each six month time interval.

For the earliest separatee cohort in our data (the bottom row in table 8) we show participation rates over the entire post-separation period -- 1 percent began participation while on active duty, a total of 9.8% began participation by the end of the first six month interval, a total of 21.1 percent in the first twelve months, and so on until by 66 months, a total of 50.2 percent of the cohort had begun participation.

For more recent separatee cohorts, we observe only a part of this 66 month period, with the span of observation getting smaller and smaller as we move to successively more recent cohorts. For the most recent cohort (separated during July-December 1973) we have only observed its participation (26.7 percent) in the first six month interval.

TABLE 8

CUMULATIVE GI BILL PARTICIPATION RATES BY ENLISTED VETERANS WITH RESERVE OBLIGATION
BY SIX MONTH TIME PERIOD 1968-1973

Separatee cohort	July-Dec. '68	Jan.-June '69	July-Dec. '69	Jan.-June '70	July-Dec. '70	Jan.-June '71	July-Dec. '71	Jan.-June '72	July-Dec. '72	Jan.-June '73	July-Dec. '73	
July-Dec.'73										* (.123)	.267	
Jan.-June'73									(.091)	.223	.374	
July-Dec.'72								(.072)	.226	.412	.487	
Jan.-Jun'72							(.037)	.150	.330	.406	.455	
July-Dec.'71						(.029)	.165	.326	.408	.456	.493	
Jan.-June'71					(.020)	.163	.329	.395	.442	.478	.507	
July-Dec.'70				(.022)	.161	.322	.402	.446	.482	.512	.544	
Jan.-June'70			(.017)	.127	.291	.356	.407	.441	.472	.499	.521	
July-Dec.'69		(.016)	.109	.238	.322	.368	.408	.438	.466	.492	.512	
Jan.-June'69	(.014)	.099	.245	.307	.361	.398	.431	.458	.483	.507	.526	
July-Dec.'68	(.010)	.098	.211	.282	.320	.359	.389	.417	.441	.464	.485	.502
Ave. annual unemploy. rate												
Males 20-24	5.0	4.8	5.6	7.0	10.1	10.2	10.4	9.7	8.8	7.6	6.8	
Males 25-51	1.7	1.6	1.7	2.5	3.2	3.4	3.7	3.3	2.9	2.7	2.4	
Monthly full-time allowance - single vet - no dependents	130	130	130	130/175	175	175	175	175	175/220	220	220	270
CPI, all items	105.7	108.5	111.7	115.2	118.1	120.2	122.4	124.2	126.4	130.1	136.0	150.6
Purchasing power of GI allowance	1.23	1.20	1.16	1.13	1.52	1.48	1.46	1.43	1.41	1.38	1.74	1.79

*Number in parentheses is the proportion who began participation before release from active duty.

Source: Participation rates from data provided by MARDAC. Unemployment rates and CPI are from BLS publications. The number of observations underlying each cohort shown is very large - e.g., over 3 million enlisted reservists have separated between June 1968 and the present. Thus there is typically about 300,000 enlisted reservists in each separatee cohort shown.

As noted above, the duration of eligibility is quite long. Thus the eligibility of our most recent separatee cohort still had about nine years to run. Even for this limited period, however, the cohort data strongly suggest that an upward trend in utilization has taken place since 1968. Cumulative participation for the cohort that separated during July-December 1970 had already exceeded that of the July-December 1968 cohort by the end of our time period.

THE EFFECT OF ECONOMIC FACTORS ON PARTICIPATION

Table 8 shows that first period participation rates have varied considerably since 1968. To determine what may have caused that variation, we examined two factors that appear to have influenced participation: job availability and the monthly benefit amount. Both were changing during the period -- the real value of the benefit amount rose, although the rise was not steady, and unemployment went through a wide cyclic swing from very low unemployment to very high unemployment and back to relatively low unemployment by the end of the period.

If everything else remained constant, increases in benefit amount, by reducing the cost of training, should lead to increased participation. The expected direction of the effect of unemployment, however, is not clear. When unemployment increases, an important component of the relative

cost of training -- the amount of earnings foregone -- declines, and this would operate to increase participation. At the same time, however, high unemployment also causes the general level of disposable income available to most families and individuals to decline. This would operate to reduce participation, especially among veterans with dependent children, by making it more difficult to finance education costs not covered by the GI Bill subsidy.

Figure 8 shows the real value of benefits and participation by each cohort during the first 6 month interval. That participation increases sharply when benefit levels increase lends support for the hypothesis that the benefit amount is a strong determinant of participation. To develop a more complete explanation of why participation rates vary, we estimated a regression equation in which participation rates are determined by five variables reflecting economic conditions and personal characteristics of the eligible veterans. The variables in the equation are:

Dependent variable

Y = cumulative participation fraction

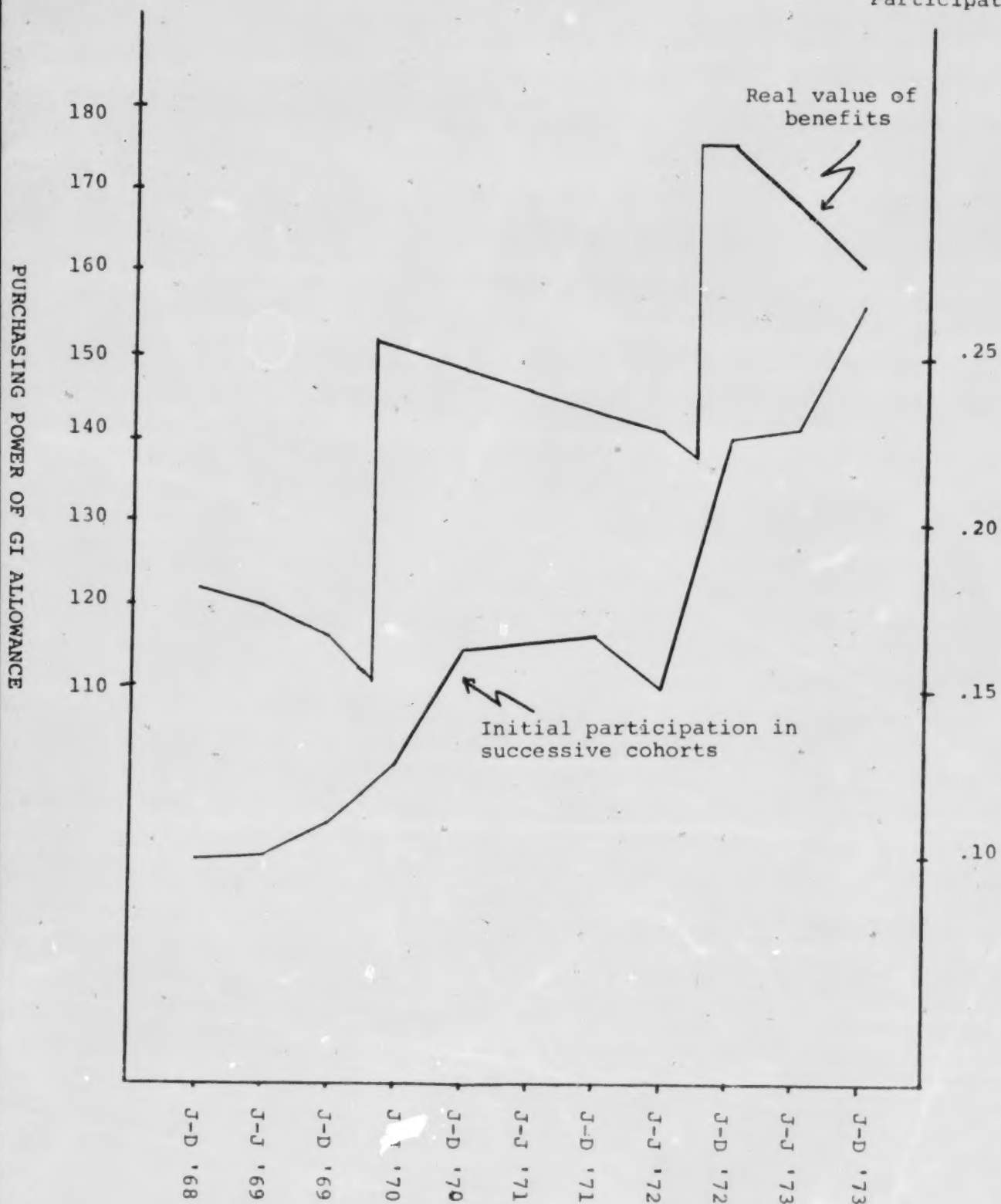
Independent variables

R = race dummy: 0 if non-black, 1 if black

Figure 8: Real Value of Benefits and First Period
Participation by Successive Cohorts of
Veterans Released Between July -
Dec 1968 and July-Dec 1973

Real Value
of Monthly
Allowance
(in dollars)

Participation



A = AFQT¹ indicator: 0=<31, 1=31-47, 2=47+

T = time out of service

E = real value of basic entitlements (monthly allowance ÷ CPI)

U = unemployment rate of adult males, age 25+.

Our equation is not meant to describe precisely the full relation between benefit amount, unemployment, time out of service and cohort participation. To model these relations satisfactorily requires more complex statistical techniques. It is adequate, however, to detect the direction of the net effect of each of the independent variables on participation.

A model including interaction terms was estimated by multiple regression analysis, using cumulative participation data tabulated for four separate race/AFQT groups.² An individual observation was the cumulative participation rate (CPR_{ij}) of the ith separatee cohort, j months after separating

¹The Armed Forces Qualification Test, which is given to every youth when he is initially examined for military service, contains 100 questions equally distributed among four areas -- vocabulary, arithmetic, spatial relations and mechanical. It is to be stressed that it is not designed to measure only innate ability characteristics -- it is an achievement type test rather than an IQ type test. For details see: Barnard Karpinos, AFQT: Historical Data (1958-1972), HumRRO Corp., Alexandria, Va., 1975.

²The groups were: black with AFQT<31, black with AFQT 31<47, non-black with AFQT 31<47 and non-black AFQT>47. All the groups are high school graduates or more. We did not include non-high school graduates because certain programmatic changes make it difficult to measure trends in the cumulative participation data precisely.

from active duty. There are 66 CPR_{ij}'s for each of the four race/AFQT groups and thus there are 264 (4 x 66) observations in the regression.

The estimated equation was:

$$Y = -.59 + .047R + .095A + .037T - .00018T^2 + .36E$$

$$(6.08) \quad (17.4) \quad (11.7) \quad (14.9) \quad (9.4)$$

$$- .008E \cdot T + .03U - .003U \cdot T$$

$$(4.4) \quad (3.5) \quad (7.36)$$

$$R^2_{Adj} = .905$$

("t" values are in parentheses)

The signs of the partial regression coefficients for the variables are consistent with expectations and they are all statistically significant.

The results indicate that veterans are more likely to enter training when unemployment rates are high, implying that the training subsidy becomes more attractive when foregone earnings diminish. One immediate implication of this finding is that the on-going economic recovery will have a negative impact on GI Bill utilization.¹ The analysis here is consistent with the view, presented in the previous

¹ This assumes that the effect of unemployment on both re-entrants and on the average duration per participant are either in the same direction or do not outweigh the positive effect on new entrants.

chapter on earnings effects, that individuals participate in the program upon leaving service when they have poor job opportunities open to them.

PARTICIPATION BY DISADVANTAGED VETERANS

The above aggregate regression shows that blacks have a higher cumulative participation rate than non-blacks. We now analyze in more detail the effects of demographic factors, such as race, on the participation decision. Table 9 shows the use of benefits by Vietnam era veterans broken down by race, prior education, and AFQT scores.

The most striking fact revealed by these data is that while black and non-black Vietnam era veterans have had about the same rate of participation in the GI Bill -- 50.9 percent for blacks and 50.5 percent for non-blacks, black veterans participate more than non-black veterans within every AFQT/prior education cell. The reason that these differentials disappear in the aggregate is that blacks have much lower distributions of AFQT scores and years of school completed at separation and (as can be seen in table 9) GI Bill participation is positively correlated with both these factors within each race group.

The data in tables 10 and 11 show that the color differential in participation rates is not the result of blacks

TABLE 9

CUMULATIVE PERCENT EVER PARTICIPATING IN GI BILL TRAINING AS OF MARCH 1974 AMONG FIRST-TERM ENLISTEES^a WHO SEPARATED FROM ACTIVE DUTY BETWEEN JUNE 1968 AND DECEMBER 1973, BY COLOR, PRIOR SCHOOLING AND AFQT SCORE

(Number of Observations in Parentheses)

Non-High School Graduates				
Race	AFQT			Total ^b
	<31	31-46	47+	
Black	38.7 (41,790)	43.2 (9,899)	45.1 (3,392)	40.2 (63,146)
Non-black	29.5 (145,609)	33.3 (84,908)	38.8 (87,602)	33.6 (360,732)
High School Graduates				
Black	48.1 (120,012)	55.3 (50,247)	61.3 (40,384)	53.9 (230,646)
Non-black	38.9 (228,337)	45.4 (340,208)	56.8 (1,591,455)	53.1 (2,349,124)

Source: Cross tabulations provided by MARDAC, Office of the Assistant Secretary of Defense for Manpower and Reserve Affairs, Department of Defense.

^a Data relate only to a specific sub-group of Vietnam era veterans -- enlisted men who separated from active duty after one term of service and who also had a reserve obligation. The major groups omitted are: female veterans, officers, those who separated after more than 6 years of active duty, and those who received medical or unsuitability discharges. The patterns of participation by schooling, AFQT and color may be different among these groups.

^b Includes those whose AFQT score was unknown.

TABLE 10

DISTRIBUTION BY TYPE OF TRAINING^a OF PARTICIPANTS AMONG FIRST TERM ENLISTEES^b WHO SEPARATED FROM ACTIVE DUTY DURING FY 1969, BY RACE, SCHOOLING, AND AFQT SCORE (PERCENT DISTRIBUTION)

	Non-Black						Black					
	AFQT: <31	<HS. 31 <47	47+	<31	HSG+ 31 <47	47+	AFQT: <31	<HS 31 <47	47+	<31	HSG+ 31 <47	47+
TYPE TRAINING	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
College Level	13.8	19.1	31.5	39.6	46.4	61.4	19.9	27.3	38.4	48.7	56.5	66.8
Voc/Tech Institutions	22.5	20.8	17.9	19.5	15.4	9.3	33.2	31.3	22.5	30.4	22.2	12.9
OUT	20.0	19.9	19.3	17.2	18.0	13.8	14.8	14.4	14.1	7.8	9.8	10.3
All Correspondence	35.0	34.7	28.0	22.5	19.8	15.4	20.4	17.6	16.7	12.3	10.3	9.5
Other	7.6	5.5	3.2	.7	.4	.1	11.7	9.4	8.3	.8	.7	.4
Number of Observations	8484	7168	7615	17,770	39,593	209,459	2744	1044	396	12,247	7938	6737

Source: Cross tabulations provided by MARDAC, Office of the Asst. Sec. of Defense for Manpower and Reserve Affairs, Dept. of Defense.

^a The type of training is the one the veteran was enrolled in at the time of most recent termination or the one he is currently enrolled in.

^b Data relate only to a specific sub-group of Vietnam era veterans -- enlisted men who separated from active duty after one term of service and who also had a reserve obligation. The major groups omitted are -- female veterans, officers, retirees, those who separated after more than 6 years of active duty, and those who received medical or unsuitability discharges. The patterns of participation by schooling, AFQT and race may be different among these groups.

TABLE 11

MEDIAN NUMBER OF BENEFIT MONTHS USED AS OF MARCH 1974
OF A SAMPLE OF PARTICIPANTS AMONG FIRST TERM ENLISTEES^a
WHO SEPARATED FROM ACTIVE DUTY IN FY 69 BY COLOR,
SCHOOLING, AND AFQT SCORE
(Number of Observations in Parentheses)

Ed.	Race and AFQT:					
	Non-Black			Black		
	<31	31-46	>46	<31	31-46	>46
<12	4.1 (800)	4.6 (687)	7.8 (743)	4.59 (221)	4.64 (108)	5.17 (37)
12	9.6 (1783)	11.9 (3810)	16.5 (16799)	13.19 (1215)	15.23 (716)	19.84 (568)
13-15	17.7 (71)	19.4 (247)	20.6 (3401)	17.09 (82)	16.80 (54)	20.43 (89)
16+	b (5)	10.2 (44)	12.2 (784)	b (10)	11.52 (23)	18.46 (31)

Source: Calculated from data supplied by the Department of Defense, the Veterans Administration, and the Social Security Administration. See appendix A.

^aData relate only to a specific sub-group of Vietnam era veterans -- enlisted men who separated from active duty after one term of service and who also had a reserve obligation. The major groups omitted are -- female veterans, officers, retirees, those who separated after more than 6 years of active duty, and those who received medical or unsuitability discharges. The patterns of participation by schooling, AFQT and race may be different among these groups.

^bTen or fewer observations.

enrolling in less demanding types of courses and/or utilizing less benefits per participant. Indeed the data indicate that there are differentials in the same direction with regard to these two dimensions of utilization as well -- i.e., holding AFQT and schooling level constant, black veterans participate more in courses leading to formal degrees and utilize more entitlement per participant than similar non-black veterans do.¹

The other striking pattern in tables 9, 10, and 11 is the relationship between amount of prior schooling, general ability and achievement (as measured by the AFQT), and utilization of GI Bill entitlement. Each of these factors has an independent influence on participation and, since AFQT level is itself positively correlated with prior schooling, the resulting differential by education completed is quite large.

A number of factors other than prior schooling and AFQT differ by race and may also influence participation. For example, the military occupations differ by race and may influence participation in the GI Bill. Having obtained training in a highly technical skill while on active duty may encourage further training after separation. Where a veteran

¹ It is legitimate to ask here why the belief that blacks used the GI Bill less than whites has become so widespread. One important factor is that blacks tend to wait longer than whites before starting to use their benefits. Thus if the comparison is made among a group of veterans that have recently separated from active duty, white participation will be higher. Most of the special follow-up surveys of veterans have been of recently separated veterans.

lives can influence costs because of differences across states in the amount of public subdization.

To isolate the independent effects of race and prior schooling from these other factors, we analyzed the use of benefits by approximately 70,000 veterans who separated from active duty during FY 1969, using multiple regression analysis. The regression equation consists of a dummy dependent variable ($Y=1$ for a participant and $Y=0$ for a veteran who had not, as of March 1974, begun participation), and 36 independent variables (X_i), reflecting the veteran's background (age, race, test score, marital status, prior educational attainment, and location of residence) and his military experience (branch of service, military occupation, theater of service, and rank at discharge).¹

The results show that even after controlling for all of the factors in the equation, the participation rate of blacks exceeds that of non-blacks by 9 percentage points and participation of high school graduates exceeds that of non-high school graduates by 13 percentage points.

Since those with relatively little prior education are an important object of public concern, the differential by

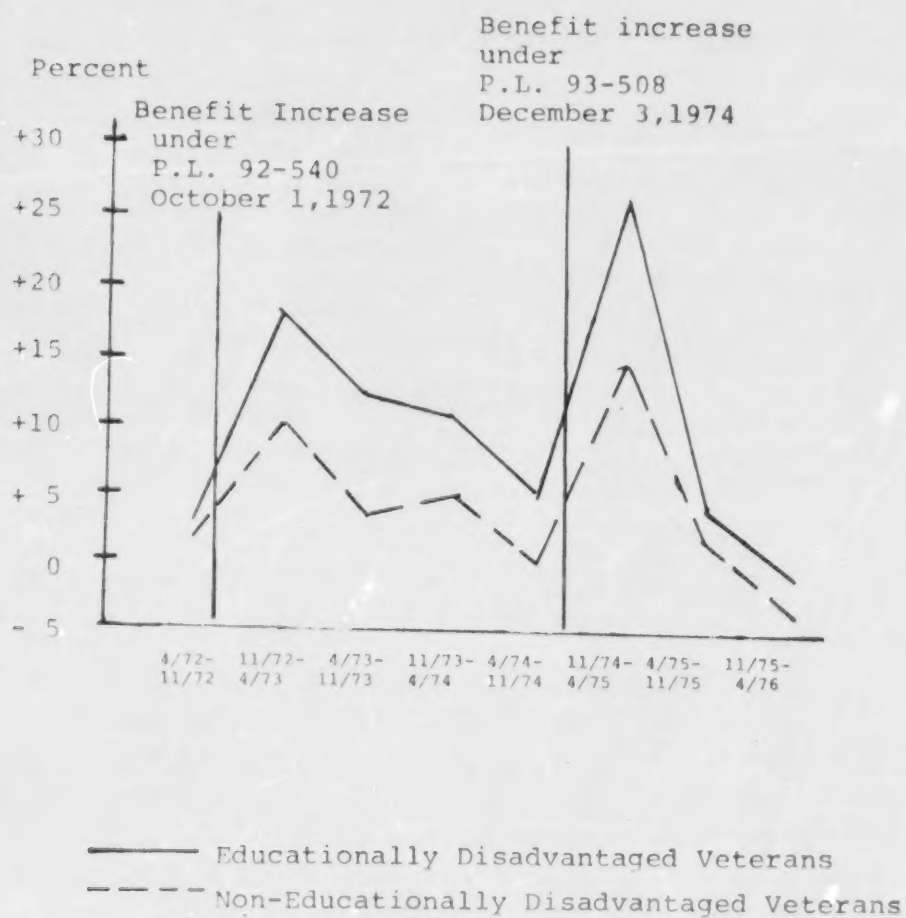
¹Details of the regressions are shown in appendix E.

level of prior schooling is disturbing. Of course, to some extent we expect greater participation among those with more schooling at separation simply because they have more ways in which to use the bill -- college level courses as well as vocational and on-the-job training. The influence of prior schooling is probably reinforced by the tendency of most states to subsidize degree-granting post-secondary schools more heavily than proprietary vocational schools. Thus the differential in the level of participation by education is probably not too relevant for the issue of how well voucher delivery systems serve the disadvantaged. More relevant is whether or not the participation of educationally disadvantaged veterans respond to changes in benefit amount and other factors influencing the costs and benefits.

Earlier we presented evidence on earnings effects -- the educationally disadvantaged veterans who participate in vocational training and OJT do appear to gain substantially in earnings. Figure 9 shows that the participation of the educationally disadvantaged has responded to recent changes in GI Bill benefit amount by more than that of the educationally advantaged veterans.¹ The chart shows the percentage increment in the number of veterans in training between successive

¹The authors would like to thank Mr. Al Peden of the VA staff for calling our attention to this fact and making the results of his study available to us before it was published.

Figure 9: Percentage Growth in the Number of Veterans in Training



Source: Veterans Benefits Under Current Programs: Information Bulletin, Department of Veterans Benefits, VA, DVB IB 20-76-5, April 1976, Chart 3, p. 23.

April to November and November to April time periods. These are peak enrollment months given the general timing of school semesters. The two vertical lines indicate when the most recent increases in the benefit amount took place.¹ There is a sharp increase in the number of trainees after each benefit amount increase, with the educationally disadvantaged responding more than others.

Note also the greater response (by both education groups) to the latest increase in benefit amount, despite the fact that it was a smaller increase. This reflects the additional effect on participation of the severe downturn in the economy that also took place during 1974-75.²

As a result of this greater responsiveness, the difference in benefit usage by high school graduates and non-graduates has narrowed substantially throughout the course of the Vietnam era program. The latest data available from the VA show that between November 1973 and November 1975, the differential by education in the percent of Vietnam era veterans who ever trained has narrowed.

¹Because of the sharp acceleration in inflation during 1974, the most recent increase represented only about a 19% increase in real terms (i.e., the benefit amount divided by the Consumer Price Index) over the previous year's benefit, while the earlier one was about a 24% increase.

²This increase in unemployment would also operate to produce a greater response to increased benefits by the educationally disadvantaged since cyclical increases in unemployment tend to fall more heavily on less educated workers. Thus the educationally disadvantaged veterans experienced a greater increase in the incentive to participate. This might explain why their response was greater than that of other veterans. The study by Peden which separates out the effects of benefit amount and unemployment changes, shows that the participation of the educationally disadvantaged still responds by more than that of other veterans.

Two other factors that may underlie the narrowing are the VA's OUTREACH program and the large increase in the PRedischarge Education Program (PREP) that has taken place since 1972. The OUTREACH program involves sending letters to educationally disadvantaged veterans soon after discharge, reminding them of their benefit entitlement and encouraging participation in the program.

The PREP program makes an effort to encourage and assist educationally disadvantaged service personnel to prepare for their future by providing secondary or remedial training as necessary prior to discharge. Starting in 1972 the military, under order from Congress, started sending more and more educationally disadvantaged servicemen for PREP courses in lieu of directly administering them a high school equivalency test. This PREP training may have led some educationally disadvantaged servicemen, who would not have done so, to participate in the GI Bill subsequently as veterans. It is too early to have been able to assemble the type of follow-up data required to estimate the effect of the increase in PREP on subsequent participation.¹

In summary, the data on use of benefits show that:

- o A higher proportion of blacks use their GI Bill training entitlement than do non-blacks with similar characteristics.

¹A recent study by the VA suggests that the effect of PREP on subsequent participation, if it exists at all, may not be very large. See, The Use of "Free Entitlement" Under the Vietnam Era GI Bill, prepared by: Reports and Statistics Service (042a1) Office of the Controller, Veterans Administration, August 1976.

- o Disadvantaged groups use their benefits to support real training. That is, they do not enroll in less demanding programs and they do not use less of their entitlements.
- o Veterans with relatively low prior educational attainment do not use their entitlements at as high a rate as those with higher attainments, but the gap in utilization is diminishing.
- o The use of benefit entitlements is influenced by the real value of benefits. When benefit levels are raised, participation increases. As the real value of benefits is eroded by inflation, participation diminishes.
- o The proportion of Vietnam era veterans who will ever make use of their benefit entitlements will be substantially higher than that of veterans in earlier periods.

We interpret these results as support for the GI Bill as a voucher program. Clearly, the findings about the differentials by race and the vigorous response of participation by the educationally disadvantaged veterans to changes in benefit amount, combined with our findings on earnings gains, suggest that the clients served by manpower programs are aware of the benefits of education and can be expected to use vouchers successfully.

CHAPTER 4

SUMMARY AND CONCLUSIONS

Three basic questions must be answered in assessing the utility of a voucher system for funding training programs:

- o Do suppliers respond to the market incentive by offering valuable training?
- o Do trainees respond to the market incentive by taking up the opportunity of valuable training?
- o Does a voucher system lead to better outcomes than alternative delivery systems?

This study has shown that suppliers do respond to incentives by providing valuable training. We judged the value of training on the narrow criterion of whether training financed by the GI Bill led, on average, to higher earnings for participating veterans. Since the earnings of most workers grow over time as the workers gain experience, returns to training cannot be measured simply by looking at earnings growth after training; one must compare the earnings of trainees to the earnings of individuals who differ from trainees only in that they did not go through training.

The procedure we used involved matching trainees and non-trainees on the basis of personal characteristics and, most importantly, on the basis of earning capacity as measured by prior labor market experience. Four types of training were analyzed in this way: vocational training, on-the-job training, college training, and correspondence training. Since vocational and on-the-job training are similar to training supported by other programs administered by the Labor Department, we concentrated on them in the analysis, and our most important findings relate to those types of training.

The results of the analysis showed that:

- o Vocational training increases the earnings of trainees to a level about 10 percent above what they would have earned in the absence of training.
- o Vocational training is particularly valuable for blacks who gain \$500-\$600 per year more in annual earnings than do otherwise similar non-black trainees.
- o On-the-job training is also associated with higher earnings although, for many of the trainees, the higher earnings are realized when training begins.

This suggests that higher earnings associated more with having gained entry to a given occupation than with the particular skills imparted through the training. The availability of funding leads to only slightly improved access to OJT opportunities.

- o Correspondence training requires no loss of income during the training period but produces no gain in earnings when it has been completed.

In analyzing patterns of use of benefits, the study also showed that eligible veterans respond to the opportunity for training provided by the GI Bill. Concentrating on veterans released from active duty since 1968, the study found that the use of GI Bill benefits is already higher than it was in earlier groups of veterans, and total use will exceed its current level when eligibility has ended.

The principal concern of this part of the study was to determine if veterans normally thought of as targets of public policy -- minorities and those with limited prior education -- make good use of available benefits. The importance of this issue was demonstrated in the discussion of earnings where

it was shown that blacks tend to gain relatively more from training than do non-blacks. The question is, do they take advantage of the opportunity provided by the GI Bill? The study showed that:

- o On average, blacks and non-blacks use benefits at about the same rate but, in groups with equal prior education and achievement test scores, blacks use benefits at a substantially higher rate.
- o Within each test score and prior education group, blacks attend college and vocational training at a higher rate than non-blacks, but use OJT at a lower rate, perhaps reflecting restrictions on entry into certain occupations.
- o When race and test score are held constant, veterans with less prior education use benefits at a lower rate than those with more prior education. Recent trends indicate that this gap in usage is narrowing.

Ultimately, judgment of voucher funding of training must rest on two issues: First, is training received under a voucher system more efficient than training received from more traditional delivery systems? The study addressed this

issue only peripherally by comparing earnings effects of vocational training under the GI Bill and estimates, drawn from other studies, of the effects of institutional training under the MDTA program. The principal conclusion is that voucher funding produces a greater increase in earnings. Whether this is because the trainee has been able to select courses more to his taste and he therefore performs better, or because training provided in response to demand expressed through the market is more closely aligned with job opportunities for trainees, or for some other reason, must remain a subject for future study.

Second, is voucher funding preferable on grounds other than the efficiency of the delivery system? The answer to this second question cannot be extracted from the kind of analysis presented here. One of the main virtues of a voucher system is that it does not substitute the judgment of a central decision-maker for that of the individual. Reliance on the trainee to choose what is best for him reflects a basic vote of confidence in the individual by society. That is a value in itself, and, although it cannot easily be assessed, it may outweigh all other considerations about alternative delivery systems.

APPENDIX A

ADMINISTRATIVE PROCEDURES TO CONTROL FRAUD AND MAINTAIN QUALITY

BACKGROUND

The administrative system now in use by the VA evolved after World War II. The amount of fraud in the early years of the GI Bill of World War II led to development of a control system heavily oriented toward preventing (or, at least, minimizing) fraud.

The original GI Bill was not meant to provide schooling for all veterans who had served honorably.¹ Each veteran had to demonstrate that his educational/training plans had been interrupted by the war. There was also an age limitation and a requirement for minimum length of course.

A relatively small, self-policing program was envisaged. Only a minimal administrative apparatus was set up for approving schools. The approval function was entrusted to the states, but no special administrative funding was provided. It was expected that the program would not require anything more than what states were already doing in school licensing.

¹ Most of this historical material is taken from: Final Report on Educational Assistance to Veterans: A Comparative Study of Three GI Bills, Committee Print #18, Chapter 12, Committee on Veterans' Affairs, United States Senate, September 20, 1973.

Under the reimbursement system, the student had little pecuniary incentive to watch tuition costs. He received a living expense allowance, and the VA reimbursed the school for its tuition fee. The veteran received the same amount for living expenses, regardless of the tuition costs,¹ as long as the school was considered genuine by the VA.

In late 1945, the original 1944 GI Bill legislation was amended, creating the type of entitlement program we have today. All a veteran had to do to establish basic eligibility was to have served on active duty for a minimum number of months and been discharged under circumstances other than dishonorable.

A large number of proprietary institutions came into being in response to a sudden increase in demand. Unfortunately there was no correspondingly rapid increase in control mechanisms to monitor the greatly expanded program. Not surprisingly, large numbers of veterans and schools were tempted to take unfair advantage of the system.² Thus, in addition to a great increase in

¹ There was, however, a maximum amount that the VA would pay for tuition (in 1948 it was \$500). Also, the initial GI Bill was, to a slight degree, means-tested. The subsistence allowance (which was \$75 in 1948) was reduced if the veteran's earnings exceeded a specific amount.

² In fairness to the veterans involved, it should be pointed out that the regulations at the time did not provide explicit guidelines about including or excluding avocational courses. Also, there was a greater sentiment that all veterans should be allowed to share in benefits.

the effective demand for genuine education and training, there was also a great increase in the opportunity for fraud.

Both the press and the General Accounting Office documented abuses and the succeeding GI Bills included substantial reforms. The reimbursement system was changed so that a flat amount was paid to the veteran to help with both tuition and living costs. Thus, the amount he had left over to cover living expenses became a direct function of how well he had searched the market for the most efficient (least cost) school.¹ The State Approval Agency (SAA) network was formally established, funded, and given detailed rules and guidelines.

Despite all these actions, the VA's present approval system does not lack for critics.² There are two related, but still quite distinct, categories of concern.

¹Ironically, this reimbursement system, originally introduced to increase efficiency, has recently become an important and controversial source of inequity in the program. The reason is that veterans who live in states where school receive heavy tax support pay lower tuitions than veterans in other states, even though all receive the same allowance from the VA.

²The study done by the Educational Testing Service for the Senate Committee on Veterans' Affairs, op. cit., and the Ralph Nader-sponsored study, The Discarded Army, by Paul Start (Charter House, New York City, 1973) are examples of highly critical surveys. The study by Levitan and Zickler, Swords Into Plowshares: Our GI Bill (Olympus, Salt Lake City, 1973), is moderately critical. A recent study sponsored by the Office of Education, Private Accreditation Public Eligibility, H. Orlans, et al., is only mildly critical, even tending to conclude that, compared with existing alternatives, the VA system is not bad.

First, there is the feeling that many of the proprietary voc-tech schools still manage to bilk the system in ways that, if not constituting outright fraud, are close to it. The main sources of evidence for this concern are the periodic newspaper series that dramatize cases in which schools have engaged in false or misleading advertising or have run into financial troubles that leave students with no training and no tuition refund. Owners are usually painted as money-grubbing businessmen with little concern for the students' well being. Invariably, the writers discover that more than 40% of expenditures go for advertising, salesmen's commissions, and other selling costs.¹

The other category of concern, although less dramatic, is potentially more serious. Essentially, the argument here is that although the VA may have devised a fine system for minimizing fraud, it has no procedures that focus on maintaining and monitoring the quality of the training received. The most detailed statement of this line of criticism is contained in the recent study that the Educational Testing Service conducted for the Senate Committee on Veterans' Affairs.² Quality of training means how well the

¹ Although a large expenditure for advertising is always taken to be a bad thing, the precise argument is never spelled out. In another context -- that of delivering manpower services to the disadvantaged -- these activities are respectable and are called "out-reach." It is also noteworthy that there is no evidence that any large volume of complaints is received by VA regional offices from abused veterans. Officials of two SSA offices were queried by the authors on this issue (since the regional VA office forwards all complaints to the SSA). Both said the number of complaints received each year was minute relative to the number of students being served. Of course, this type of evidence is not conclusive, since it is possible that dissatisfied students may not complain, preferring to chalk it up to experience.

² Final Report on Educational Assistance..., op. cit.

course content and teachers impart the skill, the availability of job vacancies requiring the skill, and the earnings effects of training. Although there have been survey studies that tried to measure these outcome dimensions, the VA had not, until recently, made a continuing effort to monitor these dimensions of the quality of training.

After reviewing the current VA approval system in detail and comparing it with the approval system now used in the Basic Opportunity Grants (BOGs) program of the Department of Health, Education and Welfare (HEW), we shall return to these concerns and try to assess their validity.

THE VA/SSA SYSTEM IN DETAIL

As with all Federally funded programs that serve individuals throughout the country, an understanding of what goes on at the local level requires a knowledge both of Federal laws and regulations (reflecting the desires of both Congress and the Federal program administrators) and the ways in which local administrators interpret the Federal rules and regulations and, in general, go about their jobs. After describing the Federal rules and regulations that shape the system, we describe how SSA and VA administrators report their work. We shall discuss the costs of the VA approval mechanism and the latest available data.

Federal Laws and Regulations

The key Federal statutes covering the administration of GI Bill educational benefits are U.S. Code, Title 38, Chapters 34 and 36, and Code of Federal Regulations, Title 38, Section 21. Sections of Chapter 36, USC, establish a system of State Approving Agencies (to be designated by the Governors) that have the approval authority and actually carry out the approval and monitoring functions. Although a school or an individual veteran can ask for VA review, in practice the states have the final say. The Federal administrators at VA shape the system most by requiring the State Approving Agencies to carry out their approval and monitoring functions within a framework of rules and regulations. Although some of these provisions have large discretionary components, many leave little authority to the states.

Schools. Most of the specific Federal regulations are aimed at protecting the VA (ultimately the taxpayer) and the veteran against low-quality instruction, fraud, and other sharp practices by owners of non-degree-granting schools. These schools usually offer highly specialized vocational training that does not lead to formal degrees. Any proprietary, non-degree-granting institution must have been operating for two years before it can obtain approval, and no more than 85% of the enrollees can receive benefits under the GI Bill. The most recent amendments to the law (December 1974)

require that all non-degree-granting institutions (this includes both proprietary and public institutions, just so long as the course leads to a purely vocational objective) must provide "...justification showing that at least one-half of the persons who completed such course over the preceding two-year period, and who are not unavailable for employment, have been employed in the occupational category for which the course was designed to provide training."¹ Previously this provision had applied only when the vocational objective was "sales management" which, like bartending,² had acquired a notorious reputation for abuse under the first GI Bill. The new amendment was passed in response to newspaper exposés as well as public hearings held by the Federal Trade Commission into false and misleading advertising. This type of requirement is clearly a step toward monitoring the outcomes of the training provided by individual schools, as opposed to simply minimizing the number of unscrupulous institutions competing for the veterans' entitlement. Are the costs of the new restriction likely to be justified by improvements in the quality of training

¹ Subsection (1), Section 203, Title II, Public Law 93-508, 93rd Congress, H.R. 12628, Dec. 3, 1974.

² Subsection (a)(1), Section 1673, Chapter 34, Title 38, U.S.C. absolutely forbids "any bartending course or personality development course." This ban is still in effect.

received? Can the quality dimensions of training be measured accurately by the survey questions that were chosen? We shall return to these issues at the end of the chapter.

Monitoring Student Progress. Another set of Federal regulations is aimed as much as policing the behavior of the student as the behavior of the proprietor of the vocational school. Most of these regulations, contained in sub-part D, Part 21, Title 38, Code of Federal Regulations, include all the details of what each school must do in monitoring the student's progress and reporting it to the VA -- in general, making sure that the flow of benefit payment checks is matched by attendance and achievement on tests and in class. Requirements are sharply different between the degree-granting and non-degree-granting institutions and their students.

Non-degree-granting schools are required to keep records of their students' previous education and training, as well as daily attendance and academic progress. Degree-granting schools, on the other hand, are specifically exempted from the requirement to keep attendance records.

Non-degree-granting schools must certify to the VA every quarter that the student is in good standing academically and must report his attendance record for the month. If these quarterly certifications are not sent in, or if absences are excessive or grades are poor, the veteran loses his monthly benefit allowance. Degree-granting schools are exempt from this requirement, too; a

student is eligible to start receiving benefit checks as soon as the school notifies the VA that he is registered and has enrolled in his courses. The only monitoring requirement is that this initial certification tell when the courses covered by the current enrollment will end and (for colleges and universities with year-round enrollment) the dates when classes will be interrupted for vacation, holidays, etc. Thus, once a veteran has been certified as having enrolled at a degree-granting college or university, he can continue to receive his checks for as long as a year before the school must submit another written certification.

The regulations require all schools (both degree and non-degree) to report to the VA any terminations for unsatisfactory progress and to report as soon as possible.¹ But a veteran in a degree-granting school can give up studying after a month and go on receiving checks for a quarter, semester, or, in some cases, even a year before the college or university becomes aware of his poor performance. If the veteran were attending a non-degree-granting school, this situation could arise only if the school owners were willing to break the law by helping him commit outright fraud.

¹ Also, degree-granting schools face the possibility of having to reimburse the VA for benefits paid to veterans who were not in attendance if this non-attendance is discovered by the VA. The degree-granting schools, although not required to take attendance, therefore have a pecuniary incentive to do so. According to VA officials, some colleges have been certifying enrollments on a semester or school-year basis because of this potential liability.

It is clear that veterans in non-degree-granting schools are monitored much more closely than in degree-granting institutions.¹ This relative emphasis is not surprising, given the VA's early experiences with misuse and abuses, mainly with proprietary non-degree schools.

Overall Student Motivation and Progress. A few of the Federal regulations related primarily to monitoring the extent to which the veteran is earnestly pursuing a vocational or educational objective.

When the veteran first applies, he is asked to detail his previous education and training. At the end of the form, the veteran is warned that willful false statements of fact about prior

¹ The regulations defining "full-time student" is another important source of differential treatment between veterans enrolled in the two classes of schools. In a degree-granting school, the veteran qualifies for a full-time stipend by having enrolled in enough courses for his total credit-hours to exceed a specified minimum. In a non-degree-granting school, the veteran must attend classes for at least a specified number of "clock-hours" per week, to qualify for a full-time stipend; however, the minimal number of clock-hours per week almost always exceeds the number of classroom attendance hours per week associated with the minimum course credit-hour requirement (e.g., 15 credits usually means 15 hours per week of classroom lectures). Thus, for veterans in the two schools to be receiving equal benefits relative to full costs incurred (i.e., foregone earnings and leisure as well as direct tuition costs), it must be assumed that students in degree-granting courses forgo more leisure and part-time earnings as a result of study at home ("homework") than students in non-degree courses do. Without systematic empirical research, it is not possible to tell whether this is a plausible assumption. A host of factors are involved: location of part-time employment, flexibility of the schedule of classroom hours, etc.

education or job training experience is punishable by forfeiture of benefits, criminal penalties, or both. This application is screened by a veterans claims examiner to be sure that the program of education or training desired does not overlap previous training. For example, a veteran who attended electronics school in the service and who applied for benefits to enroll in a correspondence course leading to some kind of certificate as an electronics technician, would probably have to justify the situation to the benefits officer in a regional VA office.

Some of the more blatant abuses of the correspondence course mode of training, using it either to obtain avocational training or merely to acquire an appliance (e.g., build a TV set at home as part of an electronics course) can thus be filtered out at the application stage. In addition, special requirements relating to enrollment in correspondence courses are aimed specifically at curbing abuses: The veteran must pay 10% of the cost of the course, and there must be a 10-day cooling-off period, to minimize the chance that a salesman will push the uncertain veteran into something he does not want.

A veteran is limited in the number of times he can freely change the objective he is pursuing with his entitlement - he is allowed to make one change without justifying it. Any changes after that must be justified; the veteran must come to a regional VA office and present his case to an educational counselor, who may or may not approve the change.

State Approving Agencies

Employees of the 80 State Approving Agencies (SAAs) actually carry out the approving and monitoring functions for the VA. The Governor of each state either designates an existing agency to assume the responsibility (usually the state department of education) or creates a new agency to approve and monitor courses for veterans.¹

The VA is willing to reimburse the states for costs incurred, and most states do in fact charge the VA for most of the additional costs. But even if all the additional costs are paid, the VA still benefits by tapping the expertise of the local personnel concerning the past histories of specific schools. The reason is that a non-degree-granting school must have been in operation for two years before it can apply for approval to serve veterans.

¹Since state departments of education perform similar tasks in executing their own basic licensing function, most of the SAAs are divisions of the states' departments of education. As of 1974-75, 29 SAAs were complete subdivisions of state departments of education, 14 were divided between state departments of education and state departments of labor (with the Department of Labor responsible for the on-the-job programs), one was fully a part of the state's department of labor, and the remainder were divided equally between being subdivisions of state veterans affairs departments and being, apparently, independent administrative units. This information was derived from the mailing addresses of the SAA's, contained in the 1974-75 issue of the directory issued by the National Association of State Approving Agencies.

The SAAs carry out the three basic functions: they approve schools, they monitor approved schools, and they investigate complaints that the regional VA office receives from dissatisfied students and school owners.¹

The Approval Function. According to the law, each state must designate one or more of its own government agencies to carry out the approval function. This is in contrast to the approach used by HEW to administer its Basic Opportunity Grants (BOGs) program. Under BOGs, the state governments essentially share approval authority with various national accrediting associations recognized by HEW.

According to Section 1775 of Chapter 36, Title 38, USC, the SAA may accept the accreditation of a school's courses as enough evidence for granting approval. The accrediting agency or association itself must be one that is approved by the U.S. Office of Education.

The SAAs can (and do) require any school (in principle, this means colleges and universities as well as non-degree-granting schools) to pass a detailed approval inspection administered by the SAA staff (a "1776" approval). Sub-section 1776(c) of Chapter 36, Title 38, USC, lists these 14 points that SAA must apply as standards:

¹ In general, the VA receives very few complaints from veterans pertaining to performance of schools. It does, perhaps surprisingly, receive a few complaints each year from schools about veterans who are not performing well enough. The school administrators would like to work with the veteran through the SAA to improve his performance rather than drop him.

"(c) The appropriate State approving agency may approve the application of such institution when the institution and its nonaccredited courses are found upon investigation to have met the following criteria:

(1) The courses, curriculum, and instruction are consistent in quality, content, and length with similar courses in public schools and other private schools in the State, with recognized accepted standards.

(2) There is in the institution adequate space, equipment, instructional material, and instructor personnel to provide training of good quality.

(3) Educational and experience qualifications of directors, administrators and instructors are adequate.

(4) The institution maintains a written record of the previous education and training of the eligible person and clearly indicates that appropriate credit has been given by the institution for previous education and training, with the training period shortened proportionately and the eligible person and the Administrator so notified.

(5) A copy of the course outline, schedule of tuition, fees, and other charges, regulations pertaining to absence, grading policy, and rules of operation and conduct will be furnished each eligible person upon enrollment.

(6) Upon completion of training, the eligible person is given a certificate by the institution indicating the approved course and indicating that training was satisfactorily completed.

(7) Adequate records as prescribed by the State approving agency are kept to show attendance and progress or grades, and satisfactory standards relating to attendance, progress and conduct are enforced.

(8) The institution complies with all local, city, county, municipal, State, and Federal regulations, such as fire codes, building and sanitation codes. The State approving agency may require such evidence of compliance as is deemed necessary.

(9) The institution is financially sound and capable of fulfilling its commitments for training.

(10) The institution does not utilize advertising of any type which is erroneous or misleading, either by actual statement, omission, or intimation. The institution shall not be deemed to have met this requirement until the State approving agency (A) has ascertained from the Federal Trade Commission whether the Commission has issued an order to the institution to cease and desist from any act or practice, and (B) has, if such an order has been issued, given due weight to that fact.

(11) The institution does not exceed its enrollment limitations as established by the State approving agency.

(12) The institution's administrators, directors, owners, and instructors are of good reputation and character.

(13) The institution has and maintains a policy for the refund of the unused portion of tuition, fees, and other charges in the event the eligible person fails to enter the course or withdraws or is discontinued therefrom at any time prior to completion and such policy must provide that the amount charged to the eligible person for tuition, fees, and other charges for a portion of the course shall not exceed the approximate pro rata portion of the total charges for tuition, fees, and other charges that the length of the completed portion of the course bears to its total length.

(14) Such additional criteria as may be deemed necessary by the State approving agency."

A school with accreditation from an eligible association may, nevertheless, be denied approval status to serve veterans; while a school that has been denied private accreditation may obtain approval to serve veterans. The use of the 1776 approach, both to deny accredited schools and to approve non-accredited ones, is almost exclusively for non-degree-granting proprietary schools. Many non-degree-granting schools that are non-accredited obtain approval from the SAAs. Figures for 1971 show that of the 6,597 schools offering non-degree courses that

were approved for veterans, only 2,025 were also accredited by associations recognized by HEW.¹

The Orlans study also reported wide differences of opinion among state education administrators as to the reliability of private accrediting associations, especially for non-degree-granting vocational schools. The proportion of approved non-degree schools that obtain a 1775 (vs. a 1776) approval for their courses, was only about 25% in 1975, although this proportion varies considerably across states.²

The Monitoring Function. In addition to obtaining initial approval, a school must also be prepared for periodic (unannounced) visits from SAA officials to check on the maintenance standards. These periodic monitoring visits, required by Federal regulations, are a distinctive feature of the VA's system.³

The prevailing practice is to concentrate almost all the strict monitoring efforts of the SAA on non-degree-granting schools.

¹ Harold Orlans, et al., Private Accreditation and Public Eligibility, prepared for the Office of Planning, Budgeting and Evaluation of the U.S. Office of Education, Oct., 1974.

² Ibid., table 6, pp. 368-370, Vol. II.

³ As contrasted with the BOGs program, which includes no monitoring provisions.

Although the reimbursement formula used by the VA is based on factors that specify the number of visits to be made per institution,¹ the current practice is to confine unannounced inspections to non-degree-granting schools, visiting each at least once a year. The SAA resources devoted to colleges and universities are used mainly for helping to smooth relations between schools and veterans, or between schools and the VA.

In addition to the monitoring by the SAA, there is monitoring by the regional VA offices. They have compliance staffs, who conduct their own periodic (unannounced) inspection visits. Each year the compliance staff selects a sample² of schools to inspect. They work with the SAA staff to select schools believed to be on the borderline of compliance.

The Complaint Response Function. Every complaint by a veteran relating to treatment and service from a school (or from an employer, in OJT) is filed with the regional VA office, which then forwards it to the responsible SAA office for investigation. At present, there is no central compilation of complaint records within the VA. SAA agencies in Baltimore and D.C. reported no more than 10 or 20

¹One visit per institution of higher learning (IHL), 2 visits per below-college-level (BCL) school, and 2 visits per OJT site.

²In some cases, almost 100% of schools are surveyed. The VA is now laying greater emphasis on this function.

complaints a year from students. However, the absence of complaints does not necessarily imply absence of dissatisfaction. Students could be dissatisfied and just not bother to report it.

Costs of the Approval/Monitoring System. In FY 1974 the VA expended approximately \$19 million on the approval and monitoring functions. Table 1 divides these expenditures among the three groups involved - the SAAs, the schools, and the regional VA compliance teams. In contracting with VA, the SAAs use a formula for estimating expenses that allocates one full-time inspector for each 150 visits per year; every five inspectors have one supervisor. On the average, the cost per visit (to any school institution) was about \$170 in FY 1974. (For OJT sites, it was about \$50 per visit.) The average cost per visit varied from state to state because of differences in salaries, school mix, etc.

TABLE 1

VA EXPENDITURES ON APPROVAL AND MONITORING ACTIVITIES
FOR THE GI BILL EDUCATIONAL ENTITLEMENT PROGRAM: FY 1974

<u>Organization</u>	<u>Amount</u>
State Approving Agencies	\$11.6 million
School Reporting Activities	4.8 ^a
Compliance Activity by Regional VA Staff	3.0 ^a
Total	<u>\$19.4 million</u>

^aEstimated from data covering all activities at the VA's regional office.

Source: Budget Staff, Department of Veterans Benefits, Veterans Administration.

Each school can choose to be reimbursed for the costs of submitting certifications and other reports that the VA requires of schools that participate in the GI Bill. To compute the amount, the number of eligible persons enrolled as of October 31 is multiplied by \$3. If the school has agreed to receive and hold advance payment checks for any of its veteran students, it can collect an additional \$1 for each such student.

THE APPROVAL SYSTEM USED IN THE BOGs PROGRAM

It is interesting to compare the VA system with the procedures used by HEW to administer its BOGs program.¹ BOGs is similar to the GI Bill in that eligible students can use the entitlement to defray the cost of attending a wide range of post-secondary institutions - including non-degree-granting proprietary schools.² It differs sharply from the GI Bill only with regard to determination of student eligibility. Though GI Bill eligibility is independent of needs, eligibility for BOGs is closely related to the income level of the student and his family.

There are other, minor differences between the two programs. Eligibility for BOGs is confined to students with high school diplomas (or equivalent), and the post-secondary courses they take

¹It is likely that the GI Bill educational entitlement (for entering recruits) will end soon. When this happens, the BOGs program will probably be expanded and the question of whose approval system to use -- HEW's or the VA's -- may arise.

²However, it does not appear that BOGs can be used for correspondence courses or for OJT, important areas of utilization under the GI Bill. Also, the proprietary school must be accredited by an organization that is approved by HEW.

must be at least 6 months long; neither of these restrictions is in the GI Bill. Also, under BOGs the amount of entitlement received is partly tied to the amount of tuition cost incurred; therefore, the pecuniary incentive to search for lower cost schools, although present, is not as strong as under the GI Bill.¹

But, for the most part, the programs are very similar and provide a basis for comparing types of approval systems. They are both educational/training voucher programs covering a similar universe of schools and students. They have quite different types of approval/monitoring systems, however.

Under BOGs the states do not have the sole authority for granting eligibility to schools; essentially, they share it with the various accrediting associations approved by HEW. According to Federal regulations, a proprietary school must have both private accreditation and state licensure. Unlike the VA system, the states cannot approve a school that lacks (or has not applied for) accreditation. Perhaps the most important difference between the VA and HEW systems, however, is in the monitoring of the performance of schools and students. The BOGs regulations make no provision for any kind of mandatory monitoring; schools are not required to keep daily attendance records or send in monthly certification reports.

¹ Under BOGs the maximum amount of entitlement is currently \$1,400 a year, or half the estimated total cost of education or training (tuition plus living costs) during the year, whichever is lower. Thus, as long as half the sum of tuition and living costs exceeds \$1,400, the student has a dollar more for living expenses for every dollar he saves on tuition costs. Once the figure falls below \$1,400, he has only 50 cents more for living costs out of every \$1 saved on tuition.

The only visits the schools can expect are from the private accreditation association -- there are no unannounced visits from a public regulatory body.

SUMMARY

At the beginning of this chapter, we set out two types of criticisms that are often leveled at the VA's system: (1) that there are still a significant number of fraudulent and misleading proprietary schools abusing the system, and (2) that the system needs systematic administrative procedures for monitoring the quality of the outcomes of the training delivered (e.g., whether or not earnings and employment are affected, and by how much).

We believe the description of VA rules and regulations and of the practices of the SAAs has shed some light on the first concern. On the basis of this review, it appears reasonable to make the following assessment: The system of administration by the SAAs (who are themselves usually employees of the state's department of education) can make it unlikely that fraudulent and/or misleading activities are important, if the system operates and the rules are enforced. A veteran who wants to cheat must find a proprietary school that is willing to go along. But a school owner who intends fraud faces a series of requirements and controls administered by the state. Without the tacit cooperation of state education administrators, it appears highly unlikely that the GI Bill presents a highly profitable prospect to proprietary school operations intent on fraud.

With regard to the second question -- whether a voucher-type education/training program should attempt to measure the quality of training output directly -- it is difficult to make any conclusive statements. As noted above, Congress recently directed the VA to impose such a requirement on all schools that give courses leading to purely vocational objectives. These schools, as a condition of retaining approval for serving veterans, will have to survey past graduates to find out how many of them are utilizing the training on their current jobs. If, for any course, the percentage falls below 50, the school can no longer enroll new GI Bill trainees in that course. Is this a useful approach for the approval-monitoring system to take?

This requirement will impose costs on the system. Schools will have to raise their tuition to cover the costs of administering the survey, collating the results, sending summary reports to the SAA office, etc. The important questions, therefore, are whether this is likely to raise the average level of the quality of training delivered, and by how much.

Even if we assume that all problems of accurately surveying the target population are overcome, it is not obvious that the measure for quality of output -- percentage of graduates who use

I Although the government may not have to monitor the quality of outcomes continually at individual schools it should, nonetheless still make periodic general studies and measurements of outcomes under the program. There will always be problems. Even if the market is working well it takes time for the lower quality schools to be weeded out, and this will mean that some students will be hurt. All that is implied is that the losses imposed on students because of market imperfections will not be appreciably lessened (and may increase) relative to the cost of carrying out the various plans proposed for monitoring the outcomes of individual schools.

the training on their current jobs -- is a good proxy measure for the more fundamental dimensions of quality, that is, the average effect of the training on the earnings and employment stability of all trainees, both completers and non-completers.

First, the emphasis on percentage of completers does not give any weight to the completion rate itself. Although the VA reporting requirements do require that the school include data on completion rates as well as the percentage of completers in training-related occupations, it is not apparent how this information is to be used.¹

Second, although the survey attempts to find out whether the graduate does not later use his schooling for reasons beyond control by the school, the questionnaire may miss less clear-cut cases. For example, the graduate may simply change his mind after graduation and decide that the craft is not for him, that there is too much pressure on the job, etc. This person will lower the school's utilization rate. If the schools' counseling and screening functions were sharper, they might have weeded out this person. But if the school offers training in fields that are currently in high demand and is delivering quality instruction in the classroom, should it lose eligibility because of a weak counseling program?

Some use will be made of the completion rate data in connection with the expanded cooperative effort between the VA and FTC to crack down on schools that use false and misleading advertising and recruiting practices. In determining which schools to refer to the FTC for investigation, the VA plans to use the data in completion rates derived from the reports of use of schooling in the jobs that follow.

Finally, if the market mechanism functions for training subsidized by vouchers, then schools that show up poorly on the surveys would not be in business for long.

These are difficult questions, given the crudity of knowledge about how markets operate to convey information about school quality and how quickly students obtain this information and act on it. The new eligibility requirement based on utilization rate may improve quality enough to justify the additional costs -- but it may not.

It would be prudent not to deny eligibility to schools on the basis of these survey findings during the first few years.¹ During this period, the results of the surveys can be collected, tabulated, and analyzed and their costs estimated. Schools that report low utilization rates can be investigated. After the experience of a few years, we will be in a better position to know whether the approval system should incorporate the utilization rate percentage as a condition for denying eligibility.

¹The wording of the existing legislation provides a statutory requirement for the VA to deny new enrollment if a school fails the employment utilization test. The above option would thus require that Congress amend the law.

APPENDIX B
DESCRIPTION OF DATA

Much of the data used in this study was drawn from a data file created especially for the project. This file¹ contains information from the data files of three government agencies -- the Department of Defense, the Veterans Administration and the Social Security Administration. Information is available for a 10% sample of enlisted men who separated from active duty during fiscal 1969 after having completed one term of service and have a reserve commitment. The sample totaled 69,408 veterans. Not all FY69 separatees were in the sample universe. The major omitted groups are females, officers, those who separated after six or more years of active service, and those who received medical or unsuitability discharges. The sample does, however, include individuals who separated before completing their tour of duty but were considered by the military as having satisfactorily completed their obligation (so called "early outs").

The file consists of two tapes. One contains information for 34,621 veterans who had begun participation in the GI Bill educational entitlements program by March 31, 1974 ("Users").

¹For a formal documentation of our file giving tape characteristics, contents of fields, etc. see: D. O'Neill and S. Ross, Documentation of the VET-MERGE File (Public Research Institute, PRI 214-75, Arlington, Virginia, 1975).

The other contains information for 34,787 veterans who had not begun participation as of this same data ("Non-Users").

For both groups, the Department of Defense Manpower Research and Data Analysis Center (MARDAC) provided Department of Defense information from their "Post-Service File." This includes such military information as pay grade at discharge, branch of service, military occupational specialty (MOS), duty in Vietnam indicator, score on the Armed Forces Qualifying Test (AFQT), as well as socio-demographic information such as race, education at time of separation, date of birth, state of residence at discharge, marital status, and number of dependents.

In addition, the MARDAC Post Service File contains information from a mail-survey of veterans, taken ten months after separation. The items covered included updates of education level, marital status, and number of dependents, as well as information on employment status, weekly income and hours worked, and training status. Complete data from the ten-month survey are available for only 65.0 percent of Users and 62.3 percent of Non-Users.¹

The complete Social Security Administration (SSA) "Summary Earnings Record" for each veteran is also in both tapes. This

¹ About four percent of Non-Users returned partially complete questionnaires.

record includes the amount of annual covered earnings (up to the taxable maximum for that year) for each year since 1951; a quarterly pattern indicator for each year, which indicates for each quarter whether \$0, \$1-\$50, or more than \$50 of covered earnings were reported; and a self-employment/agricultural indicator for each year. The records are not complete for 1974.

In addition to the above, the user tape includes information provided by the VA on beginning and ending dates for training, type of training, full-time/part-time dates, and months of entitlement used. The training record does not contain any direct information on whether or not courses were completed, or whether or not the individual participated continuously. A continuity measure was developed from information that was available. An individual was counted as a continuous participant if he had been enrolled full time and the ratio of his months of entitlement used to the difference between his termination date and initial entry date was greater than one-half. Table B-1 shows how the users in our file are distributed by type of training continuity, and where they started training.

TABLE B-1

DISTRIBUTION OF USERS^a BY TIMING AND
CONTINUITY PATTERNS, BY TYPE
OF TRAINING

Timing and Continuity Pattern	Type Training			
	College Level	Voc-Tech	OJT	Correspondence ^b
Start before 1971 full-time and con- tinuous or part-time	66.4	50.4	62.0	49.1
Start before 1971 full-time and discontinuous	12.3	11.9	8.9	
Start after January 1, 1971	21.3	36.7	29.1	50.9
Sample size ^c	n=16,398	n=3,524	n=3,965	n=4,125

^aThis table covers a somewhat larger group of users than we used above for comparing earning profiles. The group includes users who were still enrolled in training as of March 1974 and users who had too many years of zero reported earnings in their summary earnings record. Both these groups are excluded from all of our analyses that involve comparisons of earnings profiles.

^bThere is no way of measuring continuity of participation for correspondence course users with the information in our file. This is because the amount of entitlement charged to an individual veteran depends only on the cost of the course -- i.e., it is not related to how long it will take the individual to complete.

^cNote that the total in this table (=28,012) differ from the total users in our file (34,621). The others did not have usable entries in one or more of the variables used in the table.

APPENDIX C

USING SOCIAL SECURITY DATA TO MEASURE EARNINGS

There are two basic problems in using the Social Security Administration's Summary Earnings Record (SER) data to estimate the actual total annual earnings of an individual: (1) accounting for earnings from employment in uncovered occupations and industries and (2) estimating total earnings of individuals who were in covered employment but who earned more than the maximum earnings that are subject to the social security tax (we will call this amount "tax-max").

ACCOUNTING FOR UNCOVERED EMPLOYMENT

In order to reduce biases due to the problem of failing to include earnings from uncovered employment, we dropped individual records from use in analysis. We used the following exclusion rules: For non-users we eliminated records if, for any calendar year between 1969 and 1974, the individual had no reported earnings: For users we eliminated records if no reported earnings were found in any calendar year after the year in which he terminated training. The basic rationale for this rule is that very few individuals who are not in school stay unemployed for 52 weeks or more,

and thus it is highly likely that an individual with no reported covered earnings during an entire year is working in uncovered employment, rather than being out of work. For non-users, about 13% were excluded because of one or more years with no reported earnings, and for users, approximately 13% were excluded.

The procedure will cause our inferences to be biased if two conditions hold -- (1) the excluded workers who are in uncovered employment have average earnings that differ from those individuals in our sample who are not excluded, and (2) there are differences in the proportion of trainees and non-trainees who are in uncovered employment. Thus, for example, if a higher proportion of GI Bill users tend to go into federal government jobs (which are uncovered by social security) than non-users do, and earnings in these jobs are above the user's average, our data will contain a bias against finding an effect of training on earnings. If only condition (1) holds, the overall level of our earnings estimates will be biased but between group comparisons will be valid.

ESTIMATING EARNINGS ABOVE THE TAXABLE MAXIMUM

For the group who were not excluded and whose reported covered earnings in a given year were less than the tax-max,

we simply took their reported earnings as equal to their total earnings. For any year in which annual earnings were greater than or equal to the tax-max, we used a procedure for estimating their total earnings that utilized information in the SER file on quarterly amounts reported. We projected total earnings by assuming that the tax-max was reached at the mid-point of the last non-zero earnings quarter of the year, or at the beginning of the quarter, if \$1 - \$49 was reported for that quarter, and that income was received at a constant rate through the year. If the projected figure was less than the reported figure, the larger reported figure was used.

For example, in 1972, an individual had reported earnings equal to the tax-max of \$9,000 and the coverage pattern indicated that more than \$50 in wages was reported in the fourth quarter (Q-IV) of 1972. We assumed that \$9,000 was earned in 3-1/2 quarters. This equals \$2,571.43 per quarter, or a projection of \$10,286 for the entire year.

Fourth quarter 1974 earnings had not been posted for some of our observations, and thus we had to devise procedures to take this into account. If Q-IV earnings had not been posted and reported, earnings in the first three quarters exceeded three-fourths of tax max (but were less than tax-max), the observation was treated as if tax-max would be reached at the mid-point of Q-IV; that is, 1974 earnings were set equal to four times

tax-max divided by 3-1/2. If earnings in the first three quarters were less than three-fourths of the 1974 tax-max, 1974 earnings were set equal to four-thirds times the reported earnings in the first three quarters. If Q-IV earnings had been posted, or if tax-max had been reached by the end of Q-III, 1974 figures were handled as in earlier years.

Table C-1 shows both the tax-max earnings level and the percentage of users and non-users who had reached the tax-max for each year, 1969-1974. In most cases an adjustment was needed. Moreover, in the great majority of cases where adjustments were required, some earnings were reported in all four quarters. Our estimating procedure is most reliable for these cases.

TABLE C-1

MAXIMUM EARNINGS SUBJECT TO THE SOCIAL SECURITY TAX
AND THE PERCENT OF VETERANS WITH EARNINGS
AT OR ABOVE THE MAXIMUM: 1969-1974

<u>Year</u>	<u>Tax-max Earnings</u>	<u>Percent at Tax-max by Participation Status:</u>	
		<u>Users</u>	<u>Non-users</u>
1969	\$ 7,800	7.1%	13.9%
1970	7,800	18.9	31.4
1971	7,800	28.7	43.6
1972	9,000	28.9	41.6
1973	10,800	25.1	34.7
1974	13,200	15.4	18.0

EVIDENCE ON RELIABILITY OF EARNINGS ESTIMATES

The cross tabs presented in table C-2 are designed to permit tests of the intuitive plausibility of our estimated earnings profiles. The profiles for the groups in the top two tiers of table C-2 are designed to show how their time patterns are consistent with fluctuations in overall economic conditions during the period. The sharp downturn between 1973-74 is evident, as is the downturn during 70-71, and the subsequent recovery during 72-73.

The general patterns of mean earnings by education, race, and AFQT for non-users shown in the bottom tier of table C-2, for the most part, in line with what we know about earnings patterns from census and other data.

TABLE C-2

ESTIMATED LONGITUDINAL ANNUAL EARNINGS PROFILES
(1968-1974) FOR VARIOUS SUBGROUPS IN THE VET-MERGE FILE

Subgroup	1968	1969	1970	1971	1972	1973	1974
<u>By Participation Status</u>							
(26,795) All Users	\$2586	\$4196	\$5011	\$5525	\$6611	\$7817	\$8410
(18,209) Users (term.only ^{a/})	2575	4089	4865	5458	6707	8256	9035
(26,067) All Nonusers	2673	5305	6531	7231	8292	9450	9878
<u>By Race</u>							
(5,091) All Blacks	2417	4147	5059	5513	6410	7270	7378
(50,975) All Nonblacks	2640	4792	5807	6398	7440	8628	9139
(3,877) Blacks (term.only)	2409	4143	5066	5567	6545	7550	7745
(43,317) Nonblacks (term.only)	2645	4854	5892	6533	7641	8941	9510
<u>Nonusers by education, AFQT, and Race</u>							
ED<12							
AFQT <31							
Black (406 ^{b/})	2174	3725	4568	5088	5921	6794	6486
Nonblack (2108)	2292	4393	5342	5911	6827	7852	8035
AFQT 31-46							
Black (110)	2360	3863	4844	5351	6314	6959	7562
Nonblack (1273)	2561	4528	5604	6234	6973	8136	8401
AFQT 47+							
Black (23)	2363	3949	4953	5306	6859	7484	6451
Nonblack (1019)	2628	4870	5752	6364	7300	8332	8734
ED=12							
AFQT <31							
Black (912)	2374	4372	5617	6289	7292	8240	8242
Nonblack (2485)	2524	5075	6302	6962	7990	9115	9399
AFQT 31-46							
Black (391)	2592	4823	5750	6451	7583	8700	8788
Nonblack (3655)	2700	5329	6488	7213	8258	9340	9711
AFQT 47+							
Black (228)	2859	5279	6467	7230	8568	9648	10034
Nonblack (10,352)	2826	5645	6881	7590	8709	9901	10404
ED >12							
AFQT <31							
Black (63)	2324	4992	6416	6951	8349	8965	9499
Nonblack (93)	2382	5133	7015	7463	8677	10085	10371
AFQT 31-46							
Black (45)	2483	4650	6055	6463	7108	8419	8408
Nonblack (241)	2569	5597	7374	8206	9499	10726	11517
AFQT 47+							
Black (39)	2876	6096	7740	8071	8658	10085	11439
Nonblack (2588)	2769	6144	7891	8781	9994	11464	12399

^{a/} Excludes those users who were still enrolled in training as of March 1974.

^{b/} Number of veterans used in calculated mean earnings.

APPENDIX D

TECHNICAL APPENDIX TO CHAPTER 2

EFFECT OF VOCATIONAL TRAINING ON EARNINGS

Comparison Group Earnings Profiles

To obtain estimates of what the earnings of vocational trainees would have been in 1971-74 in the absence of training, we first estimated a multiple regression equation for non-user earnings in the years 1971, 1972, 1973, and 1974. Independent variables included both personal characteristics and earnings in 1969 and 1970. The coefficients of the two prior earnings variables in these equations were used to adjust post 1970 earnings for differences in early job opportunities.

$$(1) \quad Y_t = \alpha_t + \sum_{i=1}^m \beta_{it} X_i + \gamma_t Y_{69} + \delta_t Y_{70}$$

where:

t = 1971, 1972, 1973, and 1974

X_i = personal characteristics (prior schooling, AFQT score, etc.) of non-users

Y = annual earnings of non-users.

We then estimated what the earnings of users would have been in 1971, 1972, 1973, and 1974 by adjusting average non-user earnings ($\bar{Y}_t$) in these years for the effects of differences between the non-user and user population in earnings potential and in personal characteristics (the X_i). In

symbols we computed:

$$(2) \quad \hat{Y}_t = \bar{Y}_t + \gamma_t (Y_{69} - \bar{Y}_{69}) + \delta_t (Y_{70} - \bar{Y}_{70}) + \sum_{i=1}^n \beta_{it} (X_i - \bar{X}_i)$$

where:

- $\hat{Y}$ = projected earnings of comparison group
- $\bar{Y}_t$ = mean earnings of non-users in year t
- $\hat{Y}_t$ = estimated earnings of users in year t
- $\bar{X}_i$ = mean characteristics of non-users
- $\hat{X}_i$ = mean characteristics of users

It turned out that the slight differences between early starting voc-tech users and non-users in the personal characteristics were small and did not lead to significant earnings difference holding prior earnings constant.

Table D-1 gives the values of γ and δ that were estimated from equation (1). All coefficients are statistically significant.

TABLE D-1
ESTIMATED VALUES OF γ_t AND δ_t

<u>t=</u>	<u>γ_t</u>	<u>δ_t</u>
1971	.16	.71
1972	.26	.63
1973	.33	.61
1974	.29	.68

The γ and δ values show how much greater earnings in year t would be given a \$1 increase in earnings in 1969 and 1970. For instance, earnings in 1971 would be 16 cents greater for a \$1 increase in 1969 earnings, 71 cents greater for a \$1 increase in 1970 earnings. The reader can reconstruct the estimated profiles in table 8 by combining the values of γ and δ with the values of potential user earnings in 1969 and 1970 (row I in table 1) and the values of non-user earnings shown in table 2.

Earnings of Sub-Groups of Vocational Users

In chapter 2 we presented data for only one of fourteen groups of early starting users. We did not show any data for part-time users or full-time users who participated discontinuously. The following tables show earnings profiles for these other groups.

Table D-2 shows earnings profiles of all groups of "early starting" and continuous category trainees. All groups shown started training before January 1, 1971. The group shown in chapter 2 is indicated by an arrow. We mentioned in chapter 2 that the earnings gain of this group typified the gain for all full-time/continuous groups, except for the group that started during 1970 and terminated in 1971. This assertion can be verified by comparing the profiles in table D-2 with the comparison group profile in table 2 of chapter 2.

TABLE D-2
EARNING PROFILES FOR SELECTED VOCATIONAL TRAINEE GROUPS BY
PART-TIME/FULL-TIME STATUS, YEAR TRAINING BEGAN AND YEAR TRAINING TERMINATED

Estimated earnings in year:	Attended Full-Time ^a					Attended Part-Time				
	Started before 1970			Started during 1970		Started before 1970			Started during 1970	
				Year					Year	
	Year terminated trng.			terminated trng.		Year terminated trng.			terminated trng.	
	1970	1971	1972	1971	1972	1970	1971	1972	1971	1972
1969	\$2,677	2,847	3,496	4,365	4,180	5,200	4,626	4,276	5,096	4,391
1970	3,753	2,245	3,481	3,665	3,509	6,433	5,692	5,680	5,722	5,225
1971	6,452	4,482	2,701	4,718	1,861	7,571	6,810	5,790	6,290	6,830
1972	7,545	7,817	4,634	7,079	4,838	8,879	8,454	6,892	7,818	6,830
1973	8,895	9,098	7,797	8,125	8,264	10,045	9,351	9,036	8,888	8,628
1974	9,280	9,438	9,061	8,217	9,538	10,391	9,460	9,575	9,253	9,429
Months of entitlement used	$\bar{E}=11.7$	$\bar{E}=18.5$	$\bar{E}=24.2$	$\bar{E}=9.0$	$\bar{E}=16.8$	$\bar{E}=5.0$	$\bar{E}=10.3$	$\bar{E}=12.4$	$\bar{E}=5.1$	$\bar{E}=10.2$
Sample Size	n=243	n=126	n=46	n=180	n=52	n=147	n=88	n=54	n=123	n=35

^aIncludes only those who participated continuously.

We also stated that the gain for part-time vocational users was not as great as for full-timers. The reason for this finding cannot be seen from the data on participant earnings alone. The appropriate earnings comparison for part-time users is not the same as that for full timers. The earnings of the appropriate comparison group are considerably greater than that of the comparison group for full time users. Both profiles are shown in table D-3 along with the mean earnings of all non-users. The reason that the part-time comparison group profile is higher is that they appear to have relatively better job opportunities on leaving active duty, not that they differ in personal characteristics. Our evidence for this is that the earnings in 1969 and 1970 of late starting part-time users is much greater than the earnings of late starting full-timer users.

This is the evidence for our conjecture that part-timers would not be likely to participate if it were mandated that participation had to be on a full-time basis.

Table D-4 shows a comparison between the earnings profiles of early starting discontinuous and continuous full-timers. The post-training earnings of the discontinuous group tend to be below the earnings of continuous users, especially so for the OJT and College groups. We have not

TABLE D-3
COMPARISON GROUP EARNINGS PROFILES FOR VOCATIONAL TRAINEES

<u>Year</u>	(1) For users who went full-time	(2) For users who went part-time	(3) Average earnings of all non-users
1969	\$4,250	\$4,814	\$5,301
1970	5,078	6,134	6,511
1971	6,024	6,867	7,214
1972	7,094	7,906	8,269
1973	8,217	9,042	9,433
1974	8,576	9,459	9,856

TABLE D-4

ANNUAL EARNINGS FOR SELECTED^a USER
GROUPS BY CONTINUITY OF PARTICIPATION,
YEAR TERMINATED AND TYPE OF TRAINING

Estimated Annual Earnings in:	Continuity Pattern and Year of Termination							
	Continuous Pattern				Discontinuous Pattern			
	1970	1971	1972	1973	1970	1971	1972	1973
VOCATIONAL TRAINING								
1971	\$6508	4482	2701	3588	\$6270	3856	4269	3202
1972	7795	7817	4634	4297	7895	6664	4830	3394
1973	9102	9098	7797	5014	9085	8463	7631	4253
1974	9409	9439	9061	7727	8528	9592	7756	6032
Sample Size	n=200	n=126	n=46	n=20	n=22	n=30	n=52	n=44
COLLEGE								
1971	\$6990	3884	2040	2113	\$5946	4518	4041	4741
1972	8354	7766	4154	2386	7134	6820	4764	4889
1973	9669	9213	8180	4510	8427	8432	7123	6026
1974	10,449	9983	9305	7492	8978	8854	8026	7908
Sample Size	n=335	n=698	n=857	n=999	n=58	n=114	n=155	n=214
OJT								
1971	\$8184	8489	8366	6122	\$7558	6386	5495	5911
1972	9748	10,011	10,259	8369	8467	8857	6879	6475
1973	11,382	11,634	12,173	10,606	10,168	8868	8429	8000
1974	12,293	12,113	12,962	11,797	11,117	9688	10,085	8505
Sample Size	n=313	n=494	n=607	n=189	n=17	n=14	n=33	n=55

^a All groups started training before January 1970 and were enrolled full time at termination. The continuous users had used at least seven months of entitlement while the discontinuous users had one or more months used.

been able to derive the ideal comparison group profiles for the early starting and discontinuous vocational users because we do not have a sufficient sample of discontinuous late starters. If we assume, however, that the correct comparison group for the discontinuous users is the same as that for continuous users, then the earnings gain for discontinuous trainee users would be less than similar full-time participants in three out of four groups and about the same for one group.

DIFERENTIAL EARNINGS EFFECTS

Vocational Training

Our method for measuring differential earnings effects is to estimate identical multiple regression equations for the post-training earnings of early starting users and for the 1969 and 1970 earnings of late starting users. The post-training regressions yield estimates of post-training earnings differentials between blacks and non-blacks, holding constant other factors such as AFQT and schooling level. The post-training earnings differentials for other groups such as educationally disadvantaged and advantaged are measured simultaneously. The 1969 and 1970 regressions attempt to estimate what these same differentials would have been if the group had not taken training. Pre- and post-training differences between regression coefficients for the identical variable measure the differential training effects.

For early starting users we estimated:

$$(3) \quad Y_t^u = a + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_{18} X_{18}$$

where:

Y_t^u = earnings of early starting users in year t ;
 $t = 1974, 1973$.

X_1 = PT/FT dummy; PT = 1

X_2 = continuity measure: $1 \leq X_2 \leq 2$, with 1 = most continuous and 2 = least continuous.

X_3 = amount of entitlement used in months (continuous variable)

X_4 = AFQT score (continuous variable)

X_5 = pay grade at discharge dummy: = 1 if E5 or above;
 = 0 if below E5

X_6 = age in 1974 (continuous variable)

X_7 = 1 if education equals 12 years

X_8 = 1 if education is 13 or more years

} education dummies

X_9 = 1 if live in northeast U. S.

X_{10} = 1 if live in north central U. S.

X_{11} = 1 if live in western U. S.

} region of residence dummies

X_{12} = 1 if live in urban SMSA of over 1 million population

X_{13} = 1 if live in SMSA of 400 thousand to 1 million population

} type of place dummies

X_{14} = 1 if terminated training in 1971

X_{15} = 1 if terminated training in 1972

X_{16} = 1 if terminated training in 1973

} termination dummies

$X_{17} = 1$ if married; $= 0$ if single marital status dummy
 $X_{18} = 1$ if black; $= 0$ if non-black race dummy

The omitted reference category for the dummy variables is: a full-time participant who was less than an E5 at discharge, had less than 12 years of schooling completed at time of entry into the GI Bill, lived in the South on leaving service, in a rural area, terminated training before January 1971, was single and non-black. Note that only users who started before January 1971 and participated continuously (were part time or were full time and had a continuity ratio of 1/2 or greater) are included in this regression.

And then for late starting users we estimated:

$$(4) \quad Y_t^u = a + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_{13} X_{13} + \beta_{17} X_{17} + \beta_{18} X_{18}$$

where:

Y_t^u = earnings of late starting users in year t ;
 $t = 1969, 1970$

And the X_i 's are all as in the post-training regression except that X_{14} , X_{15} and X_{16} are excluded.

The estimated equations for 1974 and 1969 were:

Early Starting Users (Post-Training)

$$(5) \quad Y_{74} = \$3,124 + 669X_1 + 22X_2 + 21X_3 + 13X_4 + 444X_5 + 130X_6 +$$

$$(2.3) \quad (.6) \quad (.9) \quad (2.3) \quad (1.8) \quad (1.6)$$

$$763X_7 + 1440X_8 + 643X_9 + 1151X_{10} - 235X_{11} + 579X_{12} +$$

$$(1.6) \quad (2.4) \quad (1.9) \quad (3.5) \quad (.6) \quad (2.1)$$

$$222X_{13} - 791X_{14} - 592X_{15} - 1689X_{16} + 798X_{17} + 191X_{18}$$

$$(.6) \quad (2.6) \quad (1.3) \quad (2.7) \quad (2.8) \quad (.4)$$

$$R_{adj}^2 = .049, n = 1398.$$

Late Starting Users (Pre-training)

$$\begin{aligned} (6) \quad Y_{69} = & -3,311 + 739X_1 - 33X_2 - 11X_3 + 3X_4 + 258X_5 \\ & (4.4) \quad (.9) \quad (.7) \quad (1.0) \quad (1.7) \\ & + 238X_6 + 403X_7 + 453X_8 + 688X_9 + 480X_{10} \\ & (5.2) \quad (2.3) \quad (1.2) \quad (3.4) \quad (2.6) \\ & + 87X_{11} + 543X_{12} + 145X_{13} + 943X_{17} - 698X_{18} \\ & (.4) \quad (3.3) \quad (.7) \quad (6.0) \quad (3.8) \end{aligned}$$

$$R_{adj}^2 = .165, \quad n = 849$$

Note the dramatic difference in the coefficient of the race variable (X_{18}) between the pre- and post-training regressions. After training, blacks with the same AFQT, prior schooling, etc., have slightly higher earnings than non-blacks, while in the pre-training comparison, otherwise similar blacks had earnings significantly below those of non-blacks. This finding holds when the results of the 1973 and 1970 regressions are compared. This indicates that black veterans experience a greater earnings gain from vocational training than non-black veterans do.

A similar, although less dramatic, finding holds for the educationally disadvantaged as well. The coefficient of X_7 shows the earnings differential between high school graduates and otherwise similar veterans with less than a high school diploma. In the pre-training regressions it is \$403 for 1969

and \$705 for 1970, and in the post-training regressions it is \$763 in 1974 and \$625 in 1973. Since mean earnings of all early starting users was \$9,414 in 1974 and the mean earnings of all late starting users in 1969 was only \$4,388, these coefficients indicate that the relative earnings gap between high school dropouts and otherwise similar high school graduates has narrowed following vocational training.

On-the-Job Training

(a) Interaction Analysis

For this analysis we compared earnings differentials by race and schooling among OJT users after they terminated training with the same differentials among non-users.

The non-user equation was a linear model:

$$(7) \quad Y_t^{nu} = a + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_{42} X_{42}$$

where

- Y_t = earnings in year t of non-users (in dollars).
 $t = 1973, 1974$
- X_1 = months of active service
- X_2 = months after June 30, 1968 separated. $1 \leq X_2 \leq 12$
- X_3 = age in 1969 (in years)

X ₄	=	1 if military occupation was in Infantry	
X ₅	=	1 if military occupation was in Electronics	
X ₆	=	1 if military occupation was in Comm/Intel.	
X ₇	=	1 if military occupation was in Medical	
X ₈	=	1 if military occupation was in Other Technical	Military Occupation Dummies
X ₉	=	1 if military occupation was in Admin/Clerical	
X ₁₀	=	1 if military occupation was in Elect./Mech Equip Repair	
X ₁₁	=	1 if military occupation was in Crafts	
X ₁₂	=	1 if pay grade was E-3	
X ₁₃	=	1 if pay grade was E-4	
X ₁₄	=	1 if pay grade was E-5	Military Pay Grade at Discharge Dummies
X ₁₅	=	1 if pay grade was E-6	
X ₁₆	=	1 if branch was Army	
X ₁₇	=	1 if branch was Navy	Branch of Service Dummies
X ₁₈	=	1 if branch was Marines	
X ₁₉	=	1 if an inductee	Source of Procurement Dummy
X ₂₀	=	1 if served in Southeast Asia	Vietnam Duty Dummy
X ₂₁	=	1 if single	Marital/Family Status Dummies
X ₂₂	=	1 if married, no children	
X ₂₃	=	1 if live in northeast region in a rural area	

X_{24}	= 1 if live in northeast region in an SMSA of 400,000-1,000,000 population	Region and Size of Place Dummies
X_{25}	= 1 if live in northeast region in an SMSA of over 1,000,000 pop population	
X_{26}	= 1 if live in south region in a rural area	
X_{27}	= 1 if live in south region in an SMSA of 400,000-1,000,000	
X_{28}	= 1 if live in south region in an SMSA of over 1,000,000	
X_{29}	= 1 if live in north central region in rural area	Region and Size of Place Dummies
X_{30}	= 1 if live in north central region in SMSA of 400,000-1,000,000	
X_{31}	= 1 if live in north central region in SMSA of over 1,000,000	
X_{32}	= 1 if live in west region in rural area	
X_{33}	= 1 if live in west region in SMSA of over 1,000,000 pop.	
X_{34}	= 1 if AFQT score 15-29	AFQT Score Dummies
X_{35}	= 1 if AFQT score 30-49	
X_{36}	= 1 if AFQT score 50-69	
X_{37}	= 1 if AFQT 70+	
X_{38}	= 1 if schooling is 9-11 years	Schooling Completed Dummies
X_{39}	= 1 if schooling is 12 years	
X_{40}	= 1 if schooling is 13-15 years	
X_{41}	= 1 if schooling is 16+	
X_{42}	= 1 if color is black	Color Dummy

The omitted reference category for the dummy variables is: military occupation Supply and Service Handler, pay grade at discharge was E-1 or E-2, Branch of Service was Air Force, was a volunteer for service, did serve in Southeast Asia, was married with children, lived in the West region in an SMSA of 400,000 to 1,000,000 population, had an AFQT score of less than 15, completed less than nine years of formal schooling, and was white.

The estimated non-user equation for 1974 was:

$$\begin{aligned}
 (8) \quad Y_{74} = & \$10,243 - 32X_1 - 35X_2 + 166X_3 - 30X_4 + 685X_5 + 192X_6 - 514X_7 \\
 & \quad (7.3) \quad (3.9) \quad (9.1) \quad (.3) \quad (4.6) \quad (1.5) \quad (2.8) \\
 & + 58X_8 + 11X_9 + 234X_{10} + 376X_{11} + 1380X_{12} + 1863X_{13} + 2520X_{14} \\
 & \quad (.2) \quad (.1) \quad (2.3) \quad (2.7) \quad (3.3) \quad (1.6) \quad (.9) \\
 & + 2274X_{15} - 755X_{16} - 343X_{17} - 191X_{18} + 312X_{19} + 184X_{20} - 343X_{21} \\
 & \quad (7.2) \quad (5.5) \quad (2.4) \quad (1.2) \quad (3.3) \quad (2.8) \quad (3.3) \\
 & + 427X_{22} + 751X_{23} + 1713X_{24} + 1412X_{25} + 64X_{26} + 1031X_{27} + 146X_{28} \\
 & \quad (3.8) \quad (4.1) \quad (9.6) \quad (7.4) \quad (.4) \quad (5.4) \quad (.8) \\
 & + 813X_{29} + 1967X_{30} + 929X_{31} - 24X_{32} + 1040X_{33} + 624X_{34} + 988X_{35} \\
 & \quad (5.0) \quad (12.1) \quad (4.7) \quad (.1) \quad (5.9) \quad (7.9) \quad (5.3) \\
 & + 1304X_{36} + 1433X_{37} + 566X_{38} + 1678X_{39} + 2343X_{40} + 4586X_{41} - 938X_{42} \\
 & \quad (1.5) \quad (8.7) \quad (20.6) \quad (16.4) \quad (11.9) \quad (19.8) \quad (8.4)
 \end{aligned}$$

$R^2_{Adj} = .124$, $n = 24,084$, "+" values are in parentheses. All coefficients are in units of dollars.

For OJT users, we fit both linear and simple interaction models. The equations were:

Linear Model

$$(9) \quad Y_{74} = a + B_1X_1 + B_2X_2 + B_3X_3 + \dots + B_{17}X_{17}$$

Simple Interaction Model

$$\begin{aligned}
 (11) \quad Y_{74} = & a + B_1X_1 + B_2X_2 + B_3X_3 + \dots + B_{17}X_{17} + B_{18}X_1X_{17} + \\
 & B_{19}X_2 \cdot X_3 + B_{20}X_2 \cdot X_6 + B_{21}X_2 \cdot X_7 + B_{22}X_2 \cdot X_{16} + \\
 & B_{23}X_2 \cdot X_{17} + B_{24}X_2X_5.
 \end{aligned}$$

where:

- X_1 = 1 if apprenticeship; = 0 if "other OJT"
- X_2 = amount of entitlement used in months (continuous variable)
- X_3 = AFQT score (continuous variable)
- X_4 = pay grade dummy: = 1 if E5 or above; = 0 if below E5
- X_5 = age in 1974 (continuous variable)
- X_6 = 1 if education equals 12 years
- X_7 = 1 if education is 13 or more years
- X_8 = 1 if live in northeast U. S.
- X_9 = 1 if live in north central U. S.
- X_{10} = 1 if live in western U. S.
- X_{11} = 1 if live in urban SMSA of over 1 million population
- X_{12} = 1 if live in SMSA of 400 thousand to 1 million population
- X_{13} = 1 if terminated training in 1971
- X_{14} = 1 if terminated training in 1972
- X_{15} = 1 if terminated training in 1973
- X_{16} = 1 if married; = 0 if single
- X_{17} = 1 if black; = 0 if non-black

The omitted reference category for the dummy variables is: an "other" OJT, less than E5 on discharge, prior education less than High School Graduate, living in the South region, and in a rural area, terminated training in 1970 or before, was single and non-black. Note that only those users who started before January 1971 and who went continuously are included in the regression.

The estimated OJT user equations for 1974 were:

Simple Linear Model

$$\begin{aligned}
 (11) \quad Y_{1974} = & \$4180 + 1188X_1 + 103X_2 + 22X_3 - 87X_4 + 81X_5 \\
 & (4.7) \quad (5.8) \quad (4.1) \quad (.4) \quad (1.0) \\
 & + 1051X_6 + 1294X_7 + 1057X_8 + 1150X_9 + 65X_{10} \\
 & (2.4) \quad (2.3) \quad (3.4) \quad (3.7) \quad (.2) \\
 & + 1583X_{11} + 425X_{12} - 1227X_{13} - 1771X_{14} - 2187X_{15} \\
 & (6.4) \quad (1.4) \quad (3.5) \quad (4.0) \quad (4.4) \\
 & + 143X_{16} - 460X_{17}; \\
 & (.6) \quad (.8)
 \end{aligned}$$

$$R_{adj}^2 = .091, \quad n = 2113$$

Interaction Model

$$\begin{aligned}
 (12) \quad Y_{1974} = & -\$762 + 1113X_1 + 300X_2 + 2X_3 - 100X_4 + 348X_5 - 431X_6 + \\
 & (4.3) \quad (1.5) \quad (.2) \quad (.4) \quad (1.7) \quad (.4) \\
 & 1209X_7 + 1074X_8 + 1136X_9 + 121X_{10} + 1603X_{11} + 443X_{12} - \\
 & (.8) \quad (3.5) \quad (3.6) \quad (.3) \quad (6.5) \quad (1.4) \\
 & 1186X_{13} - 1757X_{14} - 2222X_{15} + 491X_{16} - 492X_{17} + \\
 & (3.3) \quad (4.0) \quad (4.4) \quad (.8) \quad (.3) \\
 & 1475X_1X_{17} + 1X_2X_3 + 63X_2X_6 + 8X_2X_7 - 13X_2X_{16} - \\
 & (1.1) \quad (1.5) \quad (1.5) \quad (.1) \quad (.6) \\
 & 32X_2X_{17} - 10X_2X_5; \quad R_{Adj}^2 = .093. \\
 & (.5) \quad (1.5)
 \end{aligned}$$

The findings discussed in chapter 2 referred to the coefficients of X_1 (the apprenticeship effect), X_{17} and $X_1 \cdot X_{17}$ (race/OJT interactions). Note that the estimates for X_{17} and $X_1 \cdot X_{17}$ are statistically not very significant. However in the 1973 earnings regressions the coefficients of these two variables had the same signs and were about the same magnitude, bolstering somewhat their statistical reliability.

(b) Detailed Cross-Tabulations

Table D-5 shows the earnings profiles of various groups of OJT users by year started, year terminated, and whether or not the OJT slot was listed as an Apprentice slot or "Other OJT" slot. Although this does not correspond exactly to a union/non-union breakdown, all of the large union situations will be identified as apprentice slots. Likewise the group identified as "other OJT" will be dominated by more informal OJT situations in small non-unionized firms.

These data are the basis for our statements in chapter 2 on the role of factors other than the GI Bill subsidy in determining the relatively high earnings of OJT users vis-a-vis other groups. Note that the 1969 and 1970 earnings of early starting apprentice users are significantly greater than those of all late starting OJT users in those same years. The situation differs sharply from that of institutional vocational training. Even when apprentice earnings are

TABLE D-5

EARNINGS OF SELECTED^a OJT USER GROUPS BY TYPE OF SLOT,
WHEN TRAINING BEGAN, AND YEAR TERMINATED

Annual Earnings In:	Type of OJT Slot and Year of Termination:							
	Apprentice Slot				Other OJT Slot			
	1970	1971	1972	1973	1970	1971	1972	1973
STARTED BEFORE 1970								
1969	6511	6209	5506	4580	5706	4858	3615	3090
1970	7453	7750	7265	5764	7577	7019	5008	3280
1971	8351	9018	8729	7367	8074	7696	5956	3853
1972	9707	10555	10620	9496	9776	9196	7896	6315
1973	11337	12212	12652	11724	11411	10772	8996	8570
1974	12282	12336	13443	12966	12302	11795	9769	9668
Average Months of Entitle- ment used:	E=16.0	E=23.8	E=25	E=25	E=15.8	E=22.1	E=25	E=25
Sample size:	n=125	n=297	n=529	n=122	n=188	n=198	n=75	n=67
STARTED DURING 1970								
1969	N.A.	5084	5593	5235	N.A.	4667	4382	3657
1970		6903	6695	6594		6191	5762	3964
1971		8106	7884	7641		7445	6569	4916
1972		9638	8777	9689		8714	8012	6584
1973		11122	10980	11892		10575	9921	8258
1974		11703	12043	13385		10828	10592	9277
Average Months of Entitle- ment used:		E=13.1	E=22.8	E=25		E=13.3	E=23.1	E=25
Sample size:		n=45	n=68	n=222		n=89	n=94	n=27
STARTED AFTER JANUARY 1, 1971 ^b								
1969	N.A.	N.A.	5218	4805	4825 ^c			
1970			6193	5827	5624			
1971			6199	6139	6545			
1972			7384	7209	7380			
1973			8630	8481	8794			
1974			9260	9290	9380			
Average Months of Entitle- ment used:			E=13.3	E=18.7	E=21.2			
Sample size:			n=94	n=257	n=111			

^aIncludes only full time users who participated continuously.^bApprentice and "other" OJT slots are not separated for the late starter. The earnings are aggregates of those of both groups of users.^cFor late starters who did not terminate from training until 1974.

N.A. = not applicable

compared with the earnings profiles of all non-users or of non-users adjusted upward to account for the somewhat greater schooling or AFQT, of OJT users (table D-6), the same picture emerges. In all cases, the 1969 and 1970 earnings of apprentice users are either above or only slightly below those of the two comparison groups.

TABLE D-6

EARNINGS PROFILES FOR COMPARISON WITH APPRENTICE OJT USERS

<u>Year</u>	<u>All non-users</u>	<u>Non-users adjusted for OJT personal characteristics</u>
1969	\$ 5,301	5,414
1970	6,511	6,746
1971	7,214	7,408
1972	8,269	8,503
1973	9,433	9,700
1974	9,856	10,057

APPENDIX E

TECHNICAL APPENDIX TO CHAPTER 3

In order to explore how variables such as race, schooling, region of residence, and military experiences affect participation, we fit a multiple regression equation to the data set we have assembled on approximately 70,000 veterans who separated from active duty during FY 1969. The equation consists of a dummy dependent variable ($Y=1$ for a participant and $Y=0$ for a veteran who had not, as of March 1974, begun participation), and a large number of independent variables (X_i). The independent variables are measures of factors that affect the veteran's participation decision: general ability level, prior training and job experience, opportunity factors like tuition costs and family responsibilities. The specific equation estimated was:

$$Y = B_0 + B_1 X_1 + B_2 X_2 + B_3 X_3 + \dots + B_{36} X_{36}$$

where:

- X_1 = age (in years)
- X_2 = 1 if military occupation was in electronics equip. repair
- X_3 = 1 if military occupation was communications/intelligence
- X_4 = 1 if military occupation was medical
- X_5 = 1 if military occupation was in other technical
- X_6 = 1 if military occupation was in admin./clerical

- X₇ = 1 if military occupation was in elect/mech equip.
repair
- X₈ = 1 if military occupation was in crafts
- X₉ = 1 if military occupation was in supply/service
handlers
- X₁₀ = 1 if pay grade was E4 at discharge
- X₁₁ = 1 if pay grade was E5 or above at discharge
- X₁₂ = 1 if in Army
- X₁₃ = 1 if in Navy
- X₁₄ = 1 if in Marine Corps
- X₁₅ = 1 if an inductee
- X₁₆ = 1 if served in Southeast Asia
- X₁₇ = 1 if married with one dependent
- X₁₈ = 1 if married with two or more dependents
- X₁₉ = 1 if live in rural northeast U.S.
- X₂₀ = 1 if live in urban northeast U.S. - over 1 million
population
- X₂₁ = 1 if live in urban northeast U.S. - 400K to 1
million population
- X₂₂ = 1 if live in rural southern U.S.
- X₂₃ = 1 if live in urban southern U.S. - over 1 million
population
- X₂₄ = 1 if live in urban southern U.S. - 400K to 1 million
population
- X₂₅ = 1 if live in rural north central U.S.
- X₂₆ = 1 if live in urban north central U.S. - over 1
million population
- X₂₇ = 1 if live in urban north central U.S. - 400K to
1 million population
- X₂₈ = 1 if live in rural western U.S.
- X₂₉ = 1 if live in urban western U.S. - over 1 million
population

- X_{30} = 1 if AFQT score is between 30 and 49
 X_{31} = 1 if AFQT score is between 50 and 69
 X_{32} = 1 if AFQT score is 70 or above
 X_{33} = 1 if completed 12 years of school only
 X_{34} = 1 if completed 1 to 3 years of college
 X_{35} = 1 if a college graduate (may also have done graduate work)
 X_{36} = 1 if race is white.

The omitted reference category for the dummy variable is:

military occupation was in infantry, pay grade was below E4 at discharge, served in the Air Force, enlisted, did not serve in Southeast Asia, single, lives in an urban area with a population between 400,000 and 1 million in the western U.S., had an AFQT score below 30, did not graduate from high school, and is black.

The estimated equation is:¹

$$\begin{aligned}
 Y = & 1.10 - 0.03X_1 + 0.04X_2 + 0.05X_3 + 0.08X_4 + 0.05X_5 + 0.03X_6 \\
 & \quad (19.3)^1 \quad (4.7)^2 \quad (5.7)^3 \quad (7.3)^4 \quad (3.5)^5 \quad (5.2)^6 \\
 & - 0.02X_7 - 0.03X_8 - 0.02X_9 + 0.01X_{10} + 0.02X_{11} - 0.08X_{12} \\
 & \quad (3.5)^7 \quad (3.4)^8 \quad (3.2)^9 \quad (1.9)^{10} \quad (2.4)^{11} \quad (8.9)^{12} \\
 & - 0.07X_{13} - 0.05X_{14} - 0.07X_{15} - 0.01X_{16} - 0.02X_{17} - 0.02X_{18} \\
 & \quad (7.3)^{13} \quad (4.8)^{14} \quad (12.2)^{15} \quad (2.4)^{16} \quad (3.3)^{17} \quad (2.4)^{18} \\
 & - 0.12X_{19} - 0.07X_{20} - 0.11X_{21} - 0.10X_{22} - 0.07X_{23} - 0.05X_{24} \\
 & \quad (10.2)^{19} \quad (6.5)^{20} \quad (8.4)^{21} \quad (9.5)^{22} \quad (5.5)^{23} \quad (4.1)^{24} \\
 & - 0.18X_{25} - 0.14X_{26} - 0.19X_{27} - 0.02X_{28} - 0.02X_{29} + 0.05X_{30} \\
 & \quad (16.8)^{25} \quad (13.3)^{26} \quad (13.7)^{27} \quad (1.4)^{28} \quad (1.5)^{29} \quad (7.8)^{30} \\
 & + 0.09X_{31} + 0.15X_{32} + 0.13X_{33} + 0.33X_{34} + 0.15X_{35} - 0.09X_{36}; \\
 & \quad (13.2)^{31} \quad (21.3)^{32} \quad (20.7)^{33} \quad (38.4)^{34} \quad (10.8)^{35} \quad (12.9)^{36};
 \end{aligned}$$

$R^2_{adj} = .10$, $n=55,802$. "t" values are in parentheses.

¹ Technical problems that sometimes arise when applying ordinary least squares regression techniques to a dummy dependent variable are not a problem here. The relatively low R^2 value may seem paradoxical given the great reliability of all the coefficients in the equation. But this simply means that forecasting whether or not an individual veteran will participate or not is still very difficult even after all the characteristics used in the multiple regression are known.

The coefficients in the regression equation support our conclusions based on simpler cross-tabulations. For instance, the coefficients of X_{36} and X_{33} show that even after controlling for all of the factors in the equation, the participation rate of blacks exceeds that of non-blacks by 9 percentage points and that of high school graduates exceeds that of non-high school graduates by 13 percentage points.